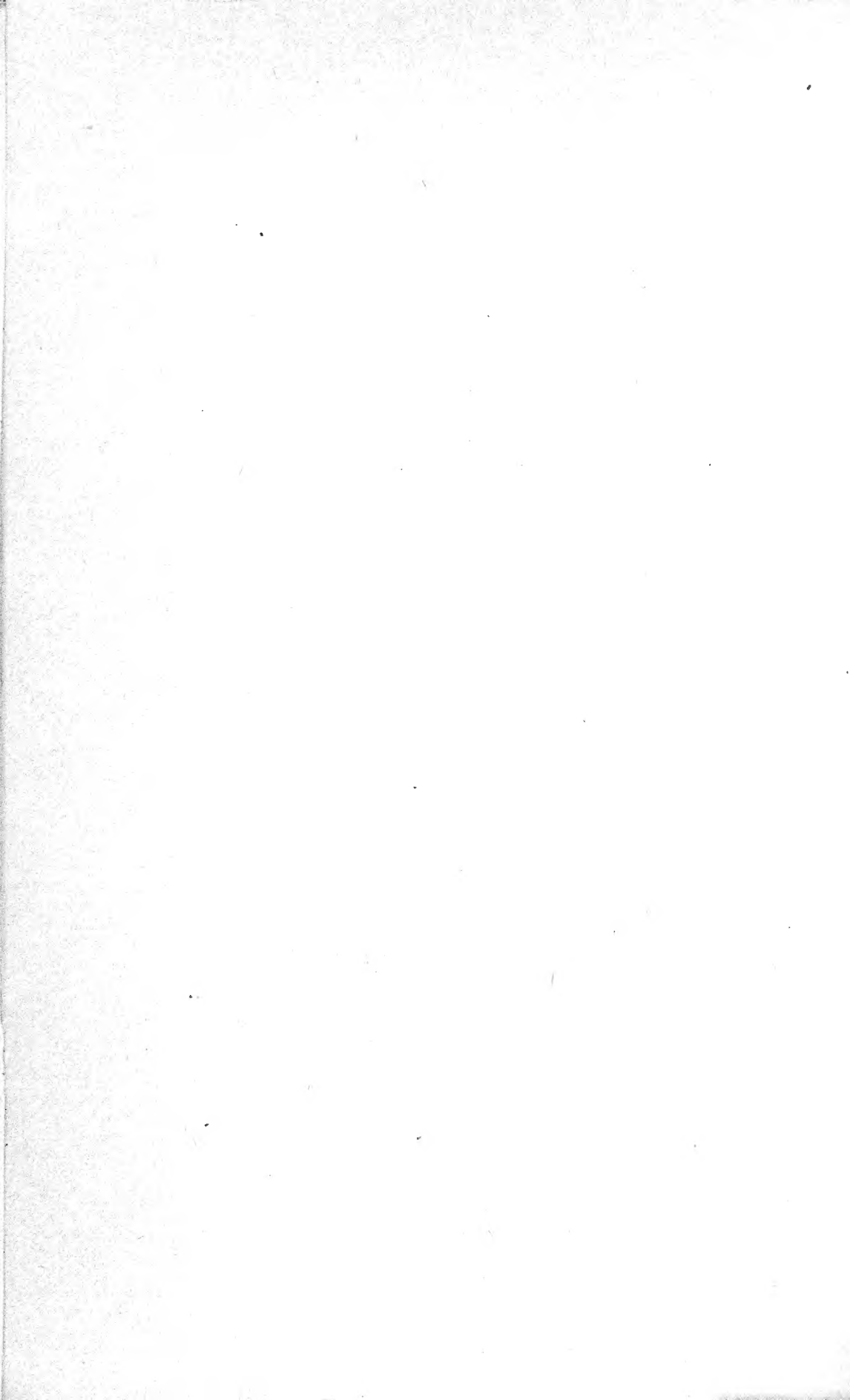


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GENERAL INDEX.

	Page.		Page.
A.		Blackhead in Turkeys	37
Abortion in Cattle, Contagious ...	183	Blackleg	133
Act, Primary Producers' Organisation ...	243	Black Spot of the Vine (Anthraxnose) ...	264
Act, Primary Producers' Pool ...	370	Blowflies, Protection of Sheep from ...	102
Advisory Board, Dairy	5	Blowfly Pest	12
Agricultural College—		Boll Weevils and Overflows ...	124, 127
Bursaries	127	Boll Worm Menace	248
Egg-laying Competition 58, 232, 294,		Boonah Rural School	176
350, 400		Borer—	
Dairy Herd Milking Record 18, 117,		Banana Beetle	48, 279
232, 294, 362, 399		Banana Weevil	191
Agricultural Council Activities 1, 65, 237,		Cane Beetle (Parasite)	147, 278
253, 320, 335, 383		Cane Moth	392
Agricultural Districts Rainfalls 125, 157,		Cane Weevil, Tachinid (Parasite) ...	394
276, 381, 409		Cherry-wood	270
Agricultural Education, Legislation,		Botanical Division Exhibit	187
&c.	119, 321	Breeding, Stock	30
Agricultural Industry Organisation,		Building up the Agricultural Industry ...	320
&c. ... 1, 65, 237, 253, 320, 335, 383		Bunchy Top Disease—	
Agricultural Seeds, Purity and Ger-		Experiments	307
mination	104	In Bananas	368
Agricultural Study	414	Or Choke Throat	369
Airedale Terriers	57	Bursaries, Queensland Agricultural	
Analysis for Farmers' Seeds, Free ...	190	College	127
Answers to Correspondents 57, 130, 328,		Butter and Cheese—	
377, 418		Production	322
Anthraxnose of the Vine (Black Spot) ...	264	Show	24
Ants Attacking Sugar-cane, White ...	279	Exhibits	202
Ants, Destroying	127	Export Quality	27
Aphis, Peach	388	Selling, Co-operative	247
Apiculture Exhibits	230		
Arrowroot Pool	367	C.	
Arsenic as a Cotton Pest Killer ...	127	<i>Calliphora augur</i>	274
Astronomical Data for Queensland 64, 138,		<i>Campsomeris</i> Tasman, Digger Wasp ...	39, 231
252, 334, 382, 426		Parasite	
Australian Sugar Producers' Associa-		Cane—	
tion Exhibit	171	Attacked by White Ants	279
B.		Beetle Fumigants	393
Bacon, Ham, and Lard Exhibits ...	219	Crop Prospects in Burnett ...	246
Bacterial Diseases of Grubs	148	Grubs, Diseases, and Fumigation ...	148
Banana—		Pest Combat and Control 32, 87, 146,	
Beetle Borer	48, 279	277, 392	
Bunchy Top Disease Experiments ...	307	Top Silage	329
Bunchy Top or Choke Throat ...	368	Values Table	118
Ripening in Airtight Chambers ...	109	Canned Products, British Market ...	324
Weevil Borer	191	Carabeen Tree, Red	394
Basic Slag Problems	100	Case Moths	15
Bee Culture Exhibit	230	Cassava Growing and Manufacture ...	75
Bee Eater	120	Cattle—	
Beerburrum Fruit	120	Contagious Abortion	183
Bettle Borer—		Exhibits, National Show	221
Cane (Parasite)	278	Certificates of Soundness, Stallions 60, 137,	
Dried Apple	270	236, 307, 373	
Fumigating Cane	393	Cheese and Butter Production ...	322
Scolytidid	270	Cheese—	
Birth of another Co-operative Enter-		Exhibits	206
prise (Egg Shipping)	353	Neglect, Dairy Industry	371
		Show	24

	Page.
Chemotropism, Influence of, on <i>Lepidoderma Albo. W.</i> ...	307
Cherry-wood Borer ...	270
Chillagoe Orchard ...	92
Choke Throat or Bunchy Top in Bananas ...	368
<i>Chrysomya albiceps</i> ...	272
<i>Chrysomya Varipes</i> ...	273
Cleared Land Cultivation, Newly ...	420
Cockroaches Extermination ...	130
Coffee-growing in Queensland ...	7
Comment, Event and ... 120, 321, 367, 414	
Concerted Action and Compulsory Powers, a New Zealand View ...	322
Control and Combat of Cane Pest ... 32, 87, 146, 277, 392	
Co-operation—	
Amongst Poultrymen ...	325
And Common Honesty ...	324
In California ...	323
State-wide, Rural ...	1
Co-operative—	
Butter Selling ...	247
Enterprise, Birth of another (Egg Shipping to London) ...	353
Marketing ...	369
Correspondents, Answers to ... 57, 130, 328, 377, 418	
Cotton—	
Boll Worm ...	248
Consumption, Next Year's ...	124
Crop Outlook ...	123
Culture Director ...	417
Exhibits ...	171
Exports for 100 Years, U.S.A. ...	125
Federal Guarantee ... 120, 127, 248	
Pest Killer, Arsenic as a ...	127
Pest on Downs ...	414
Picker, Electro Mechanical ...	99
Price Conditions, Government Advance ...	357
Planter, Dont's for ...	371
Ratoon ...	415
Situation ...	122
Staple, American Prices ...	123
Yield Increase and Quality Improvement ...	2
Council of Agricultural Activities 1, 65, 237, 253, 335, 383	
Crow Trap ...	128
Cultivation of—	
Grape in Queensland ... 18, 109, 260	
Newly-cleared Lands ...	420
Cup Moths ...	270
D.	
Dairy—	
Advisory Board ...	5
Cattle Exhibits ...	223
Herd Milking Records, Gatton College ... 18, 117, 232, 294, 362, 399	
Industry, Reported Neglect of Cheese ...	371
Dawson Valley Scheme Irrigation Bill ...	321
Departmental Court Exhibits ...	165
Dehydration ...	324
Digger-wasps Parasites ...	39, 394
Dingo Pest ...	57
Director's Career, Queensland Producers' Association ...	72
Diseases—	
Experiment Station, Stock ...	182
Investigations, Plant ...	15
Poultry ...	182
<i>Dissilaria baloghoides</i> (Hauer Tree) ...	359
Downy Mildew of the Vine ...	265

	Page.
E.	
Eclipse—	
Solar ...	139
Solar, Jensen Theory ...	365
Edible Trees and Shrubs ...	187
Editorial Notes ... 119, 247, 320	
Education (Agricultural) ...	119
Egg Laying Competition, Gatton College ... 58, 232, 294, 350, 400	
Eggs—	
Setting ...	51
Shipping to London ...	353
Electro Mechanical Cotton-picker ...	99
Entomological and Related Exhibits ...	190
Event and Comment 120, 248, 321, 367, 414	
Exhibition (Royal National) ...	162-230
Experiment Station—	
Stock Diseases ...	182
Summary, Sugar ... 75, 151, 300	
Sugar Exhibit ...	165
Export Butter, Quality of ...	27
F.	
Factors in an Ideal Ration ...	410
Fallow, Summer ...	29
Farm and Garden Notes 61, 136, 249, 331, 422	
Farm Exhibits ...	229
Fertiliser Experiments, Sugar Experiment Station ...	75
Fertiliser, Fowl Manure ...	377
Field Reports, Sugar 52, 81, 143, 289, 341, 389	
Fish Poison Vine ...	419
Fly (Blow) Pest ...	12
Fly (Blow) (Protection of Sheep) ...	102
Fly (Fruit) Investigations 15, 131, 269, 344, 387	
Fly (Maggot), Facts of Importance, re Sheep ...	272
Fodder Tree from North Queensland (a Native) ...	96
Folding Saw ...	57
Forest Lands and Scrubs of Queensland ...	93
Forest Legislation and Education ...	128
Fruit—	
Australian, in England ...	122
Exhibits ...	230
Fly Investigations 15, 131, 269, 344, 387	
Standards and Packing ...	321
Fumigants for Cane Grubs (Soils) ...	148
Fumigating Cane Beetles ...	393
Fungus, &c. ... 15, 389	
Fungus Attacking <i>Campsomoris tas.</i> ...	231
Fusarium in the Tomato Plant in Queensland ...	10
Future of Sugar Industry ...	258
G.	
Garden Notes, Farm and 61, 137, 249, 331, 378, 422	
Gatton Agricultural College Bursaries ...	127
Gatton Agricultural College Egg-laying Competition 58, 232, 294, 350, 400	
Gatton Agricultural College Milking Tests ... 18, 117, 232, 294, 362, 399	
General Notes ... 54, 127, 326, 374, 417	
Germination and Purity of Agricultural Seeds ...	104
Grain Weevil Investigations ...	15
Grape Culture in Queensland 18, 109, 260	
Grasses Exhibits ...	187

	Page.
Grasshopper Eggs	270
Grass Tree	377
Grub, Bacterial Disease and Fumiga- tion (Cane)	148
Grub Pest and Fumigation	87
Gumming Disease of Cane	247

H.

Ham, Lard, and Bacon Exhibits ...	219
Hauer Tree	359
Home Tanning	346, 402
Horses, Exhibits	220
Horticulture Notes	108
Human Machine on the Land ...	101, 158

I.

Improving Quality of Cotton and Yield Increase	8
Irrigation Bill, Dawson Valley Scheme	321
Ivory Wood Tree	45

J.

Jo Jo Weed	398
-------------------	-----

K.

Kudzu	365, 367
--------------	----------

L.

Lamb Raising	367-8
Lard, Bacon, and Ham Exhibits ...	219
Layers, Selection of Egg	50
Legislation, New Agricultural ...	119
<i>Lepidoderma Albohirtum</i> W. ...	307
Lice on Pigs	328
Lime Sulphur Wash	329
Lime, Use in Stanthorpe District ...	418
Lucerne (Tree)	329
<i>Lucilia</i> —	
<i>Caesar</i>	274
<i>Sericata</i>	273

M.

Magregor, R. L., his Career, Q.P.A.	
Director	72
Machine on the Land, Human ...	101, 158
<i>Macrodiagon (Emenadia) cucullata</i> ...	39
Maggot Flies, Sheep	272
Maize Seed for Sale	107
Mangosteen from North Queensland ...	34
Meat—	
Defrosting	121
Industry, Advisory Board	417
New Markets	121
Mechanical and Electrical Cotton Picker	99
Mildew of the Vine, Downy	265
Mildew of the Vine, Powdery	268
Milking Records, Gatton College ...	18, 117, 232, 294, 362, 399
Milking Tests, Exhibits	209
Mite, Red	133, 345
Moth Borer, Cane	392
Moth, Case	15
Moth, Cup	270
Motor Spirit Manufacture	127
Mouldy Rot or Pourridie of the Vine	268
Mouse Trap, A Useful	55

	Page.
Mulch for Pineapple Growing ...	7
Mulching of Pineapple (Paper) ...	292
Mustard or Oriental Rocket (Tumbling)	362
Mystery of Roaring Rails	117

N.

Nambour Rural Schools	36
National Utility Poultry Breeders' Association Competition	235, 256
Native Fodder Tree from North Queensland	96
<i>Neopollenia stygia</i>	274
New Staff Appointments	385
New Sugar Districts	291
North Australia Physiography ...	140, 297, 359

O.

Oidium or Powdery Mildew of Vine	265
Oil from Shale	151
Oil Leather or Shammy	54
One Farm Exhibit	200
<i>Ophyra nigra</i>	274
Orchard, A Chillagoe	92
Orchard Notes	62, 134, 250, 332, 379, 423,
Organisation of Agricultural Industry	1, 65, 237, 253, 335, 383
Oriental Rocket Weed	362
Overflows and Boll Weevils ...	124, 127

P.

Paper Mulch for Pineapple Growing	7
Paper Mulching of Pineapple ...	292
Para-dichlorobenzene Notes	393
Paralysis in Young Pigs	323
Parasite—	
Cane Beetle Borer	278
Cane Weevil Borer, Tachinid ...	394
Digger Wasps	39, 394
Factors Limiting Increase of Scoliid	394
Peach Aphid	388
<i>Pennantia Cunninghamii</i> Tree ...	159
Physiography of North Australia ...	140, 297, 339
Pig—	
Exhibits	227
Lice	328
Paralysis	328
Pigs that Pay	374
Pineapple Growing, Paper Mulch	7, 292
Plant Pathology	270
Poison, Rat	417
Poison Vine, Fish	419
Poisonous Plant Seeds	189
Pool Act—	
Primary Products	321, 370
Arrowroot	367, 417
Institution Procedure	369
Legislation Need	369
Wheat	417
Poultry—	
Breeders' National Utility Associa- tion Competition	235, 356
Co-operation	325
Diseases	183
Industry, Queensland	332
Selection of Egg Layers	50
Pourridie or Mouldy Rot of Vine ...	268
Powdery Mildew of Vine	265
Price of Cotton (Government Advance)	357
Primary Producers' Act	243
Primary Producers' Association, Director's Career	72

	Page.
Primary Producers' Activities	237, 253, 335, 383
Primary Producers' Organisation	... 119
Primary Producers' Pool Act	... 321, 371
Production, Prospects, and Prices	126, 372, 416
Protection of Sheep from Blowflies	... 102
Pruning of Vine	... 109, 260
Purity and Germination of Agricultural Seeds	... 104

Q.

Quality and Yield Increase Improvement of Cotton	... 8
Quality of Export Butter	... 27
Queensland Producers' Association, Director's Career	72, 237, 253, 325, 335, 383
Queensland Trees	45, 89, 159, 359, 394

R.

Rails, Roaring, Mystery of	... 117
Rainfall in Agricultural Districts	23, 125, 157, 276, 381, 409
Ration, Factors in an Ideal	... 410
Ratoon Cotton	... 415
Rats	... 277
Rat Poison	... 417
Red Carabeen	... 394
Red Mite	... 133, 345
Ripening Bananas in Airtight Chambers	... 109
Rocket Weed, Oriental	... 362
Rural Co-operation	... 1
Rural School, Boonah	... 176
Rural School, Nambour	... 36
Russian Wolf Trap	... 56

S.

<i>Sarcophaga</i>	... 274
Saw, Folding	... 57
Scale, San Jose	... 269
Science and Industry—Reports on Blowflies	... 12, 102
Science Notes	... 39, 231, 307
Scolytid Beetle	... 270
Scrub and Forest Lands of Queensland	93
Seeds—	
Free Analysis for Farmers	... 190
Better Crops, Better Commercial	... 190, 189
Laboratory	... 189
Maize	... 107
Poisonous Plants	... 189
Purity and Germination	... 104
Setting Eggs	... 51
Shale Oil	... 151
Shammy or Oil Leather	... 54
Shanking of Vine	... 268
Sheep—	
Blowfly Protection	... 102
Exhibits	... 227
Maggot Flies	... 272
Small Flocks of, Value of Settlement	... 376, 376
Show Dates	... 53, 130
Show, National	... 163, 230
Shrubs, Edible Trees and Silage, Green Cane Top	... 187, 329
Slag Problems, Basic	... 100
Soil-fumigant for Cane Grubs	... 148
Solar Eclipse	... 139
Solar Eclipse, Jensen Theory	... 365
<i>Soliva sessilis</i> Weed (Jo Jo)	... 398

	Page.
Some Notes on Fusarium in Tomato Plant in North Queensland	... 10
Spotted Wilt of Tomatoes	... 55
Stallions Soundness Certificates	60, 137, 236, 307, 373
Standards and Packing (Fruit)	... 321
Standardised Canned Products	... 324
Stock—	
Breeding	... 30
Diseases, Experiment Station	... 182
Study of Agriculture	... 414
Sugar—	
Cane Attacked by White Ants	... 279
Districts, Now	... 291
Estimates, 1922	... 89
Exhibits	... 120
Experiment Stations Exhibits	... 165
Experiment Stations Reports	75, 151, 300
Field Reports	52, 81, 143, 289, 341, 389
Growing Districts of North Queensland	... 84
Industry, Future, Agreement Renewal	... 258
Producers' Association Court Exhibits	... 171
Sulphur and Lime Wash	... 329
Summer Fallow	... 29

T.

Table of Cane Values	... 118
Tachinid Parasite of Cane Weevil Borer	... 394
Tanning, Home	... 346, 402
Ticks Eradication	... 182
Tomato Plant, Fusarium in North Queensland	... 10
Tomato, Spotted Wilt of	... 55
Tree, Fodder	... 96
Trees and Shrubs, Edible	... 187
Trees, Grass	... 377
Tree, Lucerne	... 329
Trees, Queensland	45, 89, 159, 359, 394
Trees Suitable for Bell District	... 418
Tumbling Mustard Weed	... 362
Turkey's Blackhead Disease	... 375

V.

Vine—	
Diseases	... 263-3
Pruning	... 109, 260
Fish Poison	... 419

W.

Wasps' Parasites, Digger	... 39, 394
Weeds—	
Exhibits	... 189
Queensland	... 362, 398
Weevil Borer, Banana	... 191
Weevil Borer, Cane (Parasite)	... 394
Weevil, Grain	... 15
Wheat Pool Board	... 417
White Ants Attacks on Sugar-cane	... 279
Wilt of Tomatoes, Spotted	... 55
Wolf Trap, Russian	... 56
Wool Section Exhibits	... 17

Y.

Yeerongpilly Stock Diseases Experiment Station	... 182
--	---------

INDEX TO ILLUSTRATIONS.

	Page.		Page.
Agriculture and Stock Court (National Exhibition)	167	Entomological Panel, National Exhibition	191
Agriculture and Stock Staff	386	Equestrienne Teams Competition Winner	192
Amateur Lady Rider (Best) (Exhibition)	193	Exhibition Opening Ceremony	164
A.S.P.A. Display (Exhibition)	179	Experiment Station, Bundaberg, Sugar Experiment Station, Mackay, Sugar	155
Bacon Factory, Murarrie, Co-operative Display (Exhibition)	180	Experiment Station, South Johnstone, Sugar	304
Badila Cane, 15 months old, 55 tons per acre, W. Toates's Farm, N.Q.	327	Farm, Winning Exhibit (One Man)	186
Banana Plant Butt Infested by <i>C. sordidus</i>	280	Fodder Tree, A Native	37
Banana Sucker, Infested	282-3	Folding Saw	58
Bell de Kol Ongarrie, Friesian Bull, P. P. Falt	364	Fruitgrowers' (Southern) Society Display	178
Ben Arnold, 7 Years Champion Hack Best Amateur Lady Rider, Miss Spencer	194	Fuschia of Strathdhu, 1st Prize, I.M.S. Cow	313
Blacklands, Jean 5th of (A. Pickels)	316	Governor-General and President Interested in Jumping	181
Boonah Rural School Display	176	Governor, State, Congratulating Driver of Edna Wilkes on his Win	181
British Cotton Delegation at Government House	358	Graft Vine 19, 21, 22, 110-2, 114-6	
<i>Campsomeris tasmaniensis</i> and <i>O. radula</i> , with their Hyperparasites and Host Grubs	40	Grain Exhibit	175
Cane, 55 tons per acre, on W. Toates's Farm, N.Q., 15 months old Badila Cannery Display, State (National Exhibition)	327	Grand Parade, Royal National Exhibition	162
Carabean Tree, Red	395-6	Grape Pruning 19, 21-2, 110-2, 114-6	
Cattle Exhibits	312-9, 364	Grass, Sugar Cane, and Wheat Panels (Exhibition)	174
Champion Friesian Bull, Menelens of St. Albans (McLeod)	315	Hack Champions	194
Champion Hack (Ben Arnold, 7 years)	194	Hauer Tree	360-1
Champion Hack (Jack)	194	How Stock and Scion are Cut for W.T. Graft of Vine	21
Charms Duhalow of Oakvale (B. O'Connor)	318	Hunt Winner, Miss Ward (Ladies)	193
Coconut Tree on J. D. Joyce's Plantation, Innisfail	310	I.M.S. Bull (Thor of Greyleigh)	312-3
Co-operative Bacon Factory Display (Murarrie)	180	I.M.S. Cow, 1st Prize Winner (Fuschia of Strathdhu)	313
Cotton Delegation at Government House, British	358	Ivorywood Tree	46-7
Cotton Ginning at Brisbane Exhibition	184	Jack, Champion Hack (Miss Mullen, Rider) A. D. McKay's	194
Cotton Picker, Stukenborg Electric 99, Cotton Trophy, National Exhibition (Central)	169	Jellicoe of Narinya (J. H. Fairfax)	317
Cracow Station, Ministerial Visit	366	Jersey Judging	312
Crows' Apple Tree	90-1	Jo Jo Weed	333
Dairy Cattle	312-9, 364	Journal Corner, Agricultural	166
Dawson Valley Exhibits	186	Joyce's, J. D., Plantation and Coconuts, Innisfail	310-1
Dawson Valley Garden, Ministerial Visit to Cracow Station	366	Junior Classes at Play, Nambour Rural School	37
Display of Club Swinging by Nambour Rural School	38	Kudzu and Sweet Potatoes Feeding to Dorset Horn Lambs	397
Display, Rural School, Boonah	176	Larkspur (W. D. Carr)	319
Dorset Horn Lambs Feeding on Kudzu and Sweet Potatoes	397	<i>Lepidoderma Albohirtum</i> W.	309
Double-cleft Graft Vine	22	Lorna of Arley	316
Downy Mildew of Vine Leaf	266	MacGregor, L. R., Director, Q.P.A. Mangosteen on Burdekin Delta, North Queensland	35
Edna Wilkes's Driver Congratulated by Governor	181	Margaret Anglin, 2nd of Berry, Friesian, First Prize Winner (Hoskings)	314
Egg Consignment Shipped by "Nupba" Co-operative Society to London	354	Maud Rooker Korndyke (Brown's Friesian, First Prize Winner)	314
Eggs for London	355	Menelens of St. Albans, Champion Friesian Bull (McLeod's)	315
		Mildew of the Vine, Downy	260
		Minister for Agriculture and Field and General Staff of Brisbane Office, Department of Agriculture and Stock	386

INDEX TO ILLUSTRATIONS—continued.

	Page.		Page.
Mouse Trap, A Useful	55	Rural School Display, Boonah ...	176
Murarie Bacon Co-operative Factory		Rural School Display, Nambour ...	37-8
Display, National Exhibition ...	180	Russian Wolf Trap	56
Mustard or Oriental Rocket Weed,		Saw, Folding	58
Tumbling	363	Seeds Bureau Display, Pure ...	168
Nambour Rural School Club Swinging		Single Cleft Graft	22
Display	38	Sovereign of Warden (F. O. Hayter)	317
Nambour Rural School Football Team	38	Stock and Scion Cutting for W.T.	
Nambour Rural School Junior Classes		Graft	21
at Play	37	Stock Institute Display	182
Navel Oranges Grown by C. Robins,		Sugar-cane Panel Exhibit	174
Miriam Vale	98	Sugar Court, A.S.P.A. Display ...	179
Oaklea Noreen	364	Sugar Experiment Station, Bundaberg	155
One-man Farm, Winning Exhibit ...	186	Sugar Experiment Station, Mackay ...	85
Opening Ceremony, Royal National		Sugar Experiment Station, South	
Exhibition	164	Johnstone	304
Oranges Grown by C. Robins, Navel	98	Stukenborg Electric Cotton Picker ...	99
Oriental Rocket	363	Thor of Greyleigh, I.M.S. Bull (Chase-	
Oxford Girl (E. Burton)	319	ling)	312-3
Oxford Golden Noble (E. Burton) ...	318	Tree, Hauer	360-1
Oxford Palatine Sultan (W. T.		Tree, Ivorywood	46-7
Conochie)	315	Tree, Native Fodder	97
Parade, National Exhibition	162	Tree, Papaw	92
Papaw Tree on Mr. Vautin's Orchard	92	Tumbling Mustard Weed or Oriental	
<i>Pennantia Cunninghamii</i> Tree ...	160-1	Rocket	363
Perfect Vine Cutting	19	Unusual Ration, Mrs. H. McMartin, of	
Pialba District Exhibit, First in "B"		Pullen Vale, Feeding Dorset Horn	
Grade	185	Lambs on Kudzu Leaves and Sweet	
Popular Prize Winner, A Blue Riband		Potatoes	397
"Walker"	188	Vine Graft	19, 21-2, 110-2, 114-6
Prepared Stock and Scion with		Vine, Downy Mildew	266
Tenue Opened	21	Vine Cutting	19
Producers' Association, Director,		Walker, A Blue Riband	188
Queensland	254	Weed, Jo Jo	398
Producers' Association, Queensland,		Weed, Tumbling Mustard or Oriental	
Proposed Organisation Diagram ...	73	Rocket	363
Proper Scion for Cleft Graft	21	West Moreton District Exhibit, First	
Pruning, Grape	19, 21-2, 110-2, 114-6	in "A" Grade	185
Pure Seeds Bureau Display, Court of,		Wheat Classification Exhibit	189
Agriculture and Stock Department	168	Wheat Dump, 14,000 bags of f.a.q.,	
Queensland Producers' Association		Allora	311
Director	254	Wheat Panels, National Exhibition ...	174
<i>Radula (C.)</i> and <i>Campsomeris tas.</i>		Winner Ladies' Hunt, Miss Ward ...	193
Host Grubs and Hyperparasites ...	40	Winning Exhibit—One-man Farm	
Red Carabeen	395-6	Competi:	186
Resting, Glimpse of Judging Ring ...	188	Wolf Trap, Russian	56
Rider (Miss Spencer), Best Amateur		Wool Exhibition	172
Lady	193	W.T. Graft Brought Together and	
Roma Team	192	Ready for Ligature	2

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XVIII.

JULY, 1922.

PART 1.

ORGANISATION OF THE AGRICULTURAL INDUSTRY.

The Provisional Council of Agriculture—A Record of
Progress.

Laying the Foundations for State-wide Rural Co-operation.

Since its constitution in April last the Provisional Council of Agriculture has met on three occasions, and a brief summary of its activities and deliberations to date is set out hereunder.

1. Scheme for Organisation of the Agricultural Industry.

(a) *Queensland Producers' Association—*

The Council has adopted a scheme the outlines of which are as follows:—

- i. That there shall be established an Association, to be known as the Queensland Producers' Association, which shall be open to Dairymen, Fruit-growers, Wheatgrowers, Small Graziers, Canegrowers, Sugar Producers, and General Farmers.
- ii. The Association shall consist of a Provisional Council of Agriculture District Councils, and Local Producers' Associations.

(b) *Provisional Council of Agriculture—*

- i. That, pending the appointment of a Council of Agriculture, a Provisional Council shall be constituted, to consist of 22 members, comprised of the following:—

- 5 direct appointees of the Government,
- 5 Dairying representatives,
- 5 Fruitgrowers' representatives,
- 4 Sugar-growers' representatives, and
- 3 General agricultural representatives.

- ii. That vacancies shall be filled by the appointment of another representative for the particular division in which the vacancy occurs.
- iii. That further members may be appointed if deemed necessary by the Council.
- iv. That, briefly, the objects of the Council shall be as follows:—
 - To generally co-operate with and assist District Councils and Local Producers' Associations;
 - To engage in research work and subjects relating to the rural industries, and secure effective action for the controlling of diseases and pests;
 - To secure additional markets and improve the means of transport and distribution of produce;
 - To standardise products and assist and advise the Department of Agriculture and other State Departments;
 - Generally, to investigate and deal with all problems relating to the rural industries.
- v. That Standing Committees be appointed to report on or deal with any matters referred to them by the Council.

(c) *District Councils*—

- i. That in each district determined by the Council of Agriculture a District Council shall be established;
- ii. That pending the establishment of District Councils, the Governor in Council, upon the recommendation of the Council, may constitute provisional District Councils, the members of which shall also be appointed in the same manner. Provisional Councils so constituted shall in the ordinary course hold office for one year;
- iii. Subject to the general control of the Council, the duties of the District Councils shall include consideration of schemes with regard to production, marketing, standardisation, and the making of more profitable use of the State experts and facilities generally of the Department of Agriculture to encourage co-operative buying and selling among the primary producers in the areas covered by them, and to promote such matters as herd testing, fodder conservation, and similar activities;
- iv. To assist in every way possible the Local Producers' Associations within their areas;
- v. Generally to discharge such duties and functions as the Council may determine.

(d) *Local Producers' Associations*—

- i. Each sub-district may form a Local Producers' Association, which shall be open to all *bonâ fide* producers within the sub-district.
- ii. Subject to the general control of the District Council and the supreme control of the Council of Agriculture, duties of Local Producers' Associations shall include taking the initiative in rural matters within the sub-districts; formulating schemes to meet the requirements of producers within the sub-districts; bringing before District Councils problems of any interest and concern; generally assisting and supporting District Councils in promoting the prosperity of primary producers.

2. Standing Rules and Orders.

The Council has adopted a number of standing rules to govern its general procedure at meetings and otherwise.

3. Director, Queensland Producers' Association.

Steps have been taken with the object of securing a Director to administer (subject to the control of the Council) the affairs of the Queensland Producers' Association. The term of the appointment has been fixed at three years, and applicants are required to possess expert business, financial, and organising qualifications. Applications have been invited through the public Press of Australasia, and the closing date has been fixed for the 30th June.

4. Delegates.

A number of delegates have been temporarily appointed to visit various centres and expound the new scheme. A large number of rural districts have already been visited, and reports to hand indicate that the scheme is meeting with the unanimous approval of producers.

5. Legislation.

Legislation with respect to the constitution of the Queensland Producers' Association will be submitted to Parliament during the coming session.

6. Provisional District Organisers.

Provisional District Organisers are to be appointed forthwith. Their duties will be to follow up the work of the delegates by systematically organising the respective districts to which they are appointed, and to generally assist in the formation of Local Producers' Associations and District Councils.

7. Amendment of Fruit Cases Act.

The Government is being requested to amend the Fruit Cases Act to provide for such alterations in standards as may be found necessary from time to time.

8. Banana, Citrus, and Pineapple Standards.

The Department of Agriculture has been requested to adopt certain standards relating to bananas, citrus fruits, and pineapples, approved at recent meetings of fruitgrowers in Southern Queensland.

9. Fruit Pools.

The Government is being requested to introduce legislation of a comprehensive character, framed to cover all sections of the fruitgrowing industry, and provide for ballots to be taken of all growers, prior to making any particular pool operative.

10. Fruit Instruction and Inspection.

The Department of Agriculture has been requested to arrange for more effective instruction and inspection with respect to the picking, grading, and packing of fruit products.

11. Utilising Surplus, Waste, and Inferior Fruits.

Steps have been taken to associate the Agricultural Chemist with the Standing Fruit Committee in fully investigating the possibilities of utilising surplus, waste, and inferior fruits and vegetables.

12. Standards of Containers.

Federal Authorities are being requested to consult the Council of Agriculture prior to making any departure from the present standards of containers in use in Queensland.

13. Transport Facilities in the Carriage of Fruit.

A number of suggestions brought forward by the Standing Fruit Committee for the purpose of improving the transport facilities in the carriage of fruit over the Queensland Railways, and reducing freights on fruit, have been recommended to the Transport Committee for favourable consideration.

14. Fruit Fly.

The New South Wales Department of Agriculture is being requested by the Queensland Authorities to inquire into the matter of fly-infested orchards in New South Wales adjacent to the Stanthorpe district, with the object of having the orchards in question either cleaned or destroyed.

15. Fruit Trees true to Type.

The Department of Agriculture has been requested to take steps to ensure that trees supplied to growers by nurserymen are true to type.

16. Sugar Agreement.

The Council has decided to take steps, through Local Producers' Associations and District Councils, to further by every means a continuance of the present Sugar Agreement.

17. Productivity of Sugar Lands and Utilisation of Waste Sugar Products.

The Council is of opinion that, in regard to the question of the improvement of the productivity of sugar lands and the utilisation of waste products, everything possible is now being done, but that new developments will be kept in view.

18. Wheatgrowing. Improving Cultural Methods.

The Council, in conjunction with the Department of Agriculture and the State Wheat Board, has succeeded in effecting a considerable improvement in the cultural methods of wheatgrowing in Queensland. The scheme prepared by the Council has been adopted by the Wheat Board. It provides for the purchase by the Wheat Board from the Department of Agriculture of a quantity of specially selected seed, which will be grown under special conditions. The wheat so harvested will, in turn, be reserved for seed purposes. A new list of recommended varieties has been drawn up, and these have been allotted to certain districts, where each will be planted on a specified class of soil.

19. Organisation of Maizegrowers.

With a view to organising maizegrowers, the Department of Agriculture, on the recommendation of the Council, is now arranging to collect from growers statistical and other information for the purpose of enabling it to prepare a concrete scheme for the betterment of the conditions of maizegrowers generally.

20. Bulletins.

The Council has decided that bulletins and other literature will be issued from time to time for the purpose of keeping producers fully advised of its various activities.

21. Loans to Farmers.

To further assist in the development of the State's agricultural resources, the Council has made recommendations to greatly extend the scope of operations of the existing Co-operative Agricultural Production and Advances to Farmers' Acts.

The proposed advances are wide in their scope, and are framed to meet the needs and requirements of new settlers who may be starting operations for the first time, or others whose holdings require developing.

The Council's recommendations are intended to assist in the purchase of dairy cattle; purchase of pigs; purchase of sheep; erection of silos; erection of hay-sheds and purchase of hay-making machinery; co-operative purchase of machinery to assist agricultural production; co-operative purchase of entire, bulls, rams, and boars; construction of grain storage silos, and sheds and accessories for the storage and handling of grain.

To improve the existing marketing system, advances have also been recommended to provide for the construction of grain storage silos, &c.

22. Herd-testing.

In recognising the importance of herd-testing, the Council has decided to circulate, through Local Producers' Associations and other bodies, full information relating to herd-testing methods and their advantages generally.

23. Fodder Conservation.

The Council is of opinion that the question of fodder conservation is one of extreme importance, and it has now under consideration a scheme in this connection.

24. Additional Entomologists.

The several Standing Committees had stressed the need for the appointment of additional Entomologists to study the pests affecting all branches of the primary industries, and the Council has decided to advocate close co-operation between the Department of Agriculture, the University of Queensland, and other interested bodies, with a view to arranging for the training of men on sound scientific lines who will be able to assist in discovering means to deal effectively with such pests.

DAIRY ADVISORY BOARD.**A RECORD OF ACTION AND ACHIEVEMENT.**

A summary of the activities and deliberations of the Dairy Advisory Board is outlined hereunder:—

1. Transport.*(a) Improved Service for Transit of Dairy Products over Queensland Railways.*

The Commissioner for Railways has been asked to increase the number, and effect an improvement in the design, of trucks utilised for the conveyance of dairy products, and also to see that cream is delivered by the first possible train to factories.

The Commissioner has expressed a desire to meet the Board to discuss these matters, and arrangements are now being made for the above meeting to be held on Wednesday, the 7th June. .

(b) Manufactured Dairy Produce.

The Board was successful in inducing the Railway Authorities to make a 20 per cent. reduction in rail freights on manufactured dairy products from factories to markets.

(c) Cream.

A request for a similar reduction with regard to cream has also been successful.

(d) Bacon Factory Products.

Cabinet decided that a reduction in rail freights on bacon factory products could not be granted.

2. Cold Storage.

As a result of the representations of the Board, a section of the Government Cold Stores at Hamilton will probably be ready to receive dairy produce during the next export season.

3. Marketing and Distribution.

At the instigation of the Board, the Agent-General's Office in London will furnish the Board with a complete report on the conditions surrounding the handling, marketing, and distribution of Queensland dairy produce in London. Suggestions with regard to the improvement of such dairy produce, together with periodical reports on the market conditions, and quality of individual consignments arriving in England, will also be supplied.

4. Crating of Cheese for Export.

The Minister for Agriculture has approved of a recommendation of the Board that all cheese for export be crated at the factories. This will obviate injury in transit, and consequent depreciation of cheese hitherto sent loose by rail to Brisbane. The new decision will be given effect to as from the commencement of the next export season.

5. Herd Improvement.*(a) Utilisation of Purebred Bulls.*

In this connection the Board has recommended the establishment of Government Stud Farms in suitable centres throughout the State, and also an increase in the numbers of purebred dairy stock at the Gatton Agricultural College.

(b) Herd Book Societies' Rules.

Resolutions have been carried by the Board with the object of effecting alterations in the existing rules of Herd Book Societies. The aim of these resolutions is

to obviate, as far as possible, fraudulent practices on the part of stud stockowners, and to ensure that only animals of the highest class secure final entry in the Herd Books after passing a prescribed butter-fat test.

These resolutions are being conveyed to breeders of purebred stock, who are being asked to nominate representatives with power to act, to meet the Board and fully discuss matters.

(c) Herd-testing of Individual Herds.

The Board has prepared certain printed matter which has been handed to the Council of Agriculture with the request that steps be taken to have the information circulated amongst dairymen.

6. Stabilisation of Prices.

Members of the Board have on two occasions visited the Southern States with the object of securing a stabilised price for dairy produce within the Commonwealth. Largely as a result of their efforts (the value of which has been fully recognised in the South) Conferences of Dairymen held in New South Wales and Victoria approved of the principle. These were followed by an all-Australian Conference representative of Dairying Interests, and the Board is convinced that there is every likelihood of early arrangements being made to adopt the principle of stabilisation, by fixing a price for dairy produce within the Commonwealth.

7. Conservation of Fodder.

The Board has given a good deal of consideration to this subject, and has forwarded to the Agricultural Council, for its consideration, a scheme dealing with the matter.

8. Dual Grading of Dairy Produce.

(a) For the information of the Minister of Agriculture, the Board expressed the opinion that the best interests of the producers of Australia would be served if the Commonwealth powers in relation to the grading and examination of dairy produce should be vested in the Department of Agriculture in the various States.

(b) That the grade marking of packages of dairy produce for export should be discontinued.

9. Pasteurisation.

In order to become conversant with the best methods of pasteurising milk and cream, efforts have been made to secure up-to-date information regarding the subject. As a result the Board is now in possession of a number of informative communications from New Zealand and elsewhere, which will be turned to useful account as occasion requires.

10. General Matters.

The value of a controlling body has been largely recognised by dairy farmers and factories, as a considerable number of requests for advice on a variety of subjects are received. In this way the Board has been able to lend a good deal of useful assistance to those engaged in the industry.

11. Amalgamation with Agricultural Council.

For some time members of both the Advisory Board and the Agricultural Council had been of opinion that too many dairying representatives were included on both bodies. At a Conference held in the Premier's Office on the 15th instant, members of both the Board and the Council were unanimous in a desire to have the matter settled, and the question of making a new selection to in future constitute the Dairying Section of the Agricultural Council was left in the hands of the Premier, the Minister for Agriculture, and the Chairman of the Administrative Committee of the Council. It was subsequently announced that six representatives had been selected, and these would in future sit as the Dairying Committee of the Agricultural Council.

PAPER MULCH FOR PINEAPPLE-GROWING.

From the "Agricultural Gazette of New South Wales" we take the following method of using paper mulch:—"The idea of a paper mulch for sugar-cane was patented some years ago, but no experiments with pineapples were conducted until 1919. It is estimated that there are now 461 acres planted in paper, of which 68 acres will fruit in 1922. The paper mulch appears to consist of a strip of paper in which are cut holes large enough for the pineapple plants to grow through. The first yields from the method were obtained last year (1921), and, according to the writer, Mr. A. T. Longley, at the annual meeting of the Hawaiian Pineapple Packers' Association, it was found that the plants in paper grew uniformly larger, greener, and more healthy, and the fruit larger (equal to a little over $3\frac{1}{2}$ tons per acre) and better conditioned. The paper mulch prevents the growth of weeds and the packing of the soil under heavy rains, thus greatly reducing the cost of inter-cultivation. In an experiment at the Hawaiian Pineapple Association's Experiment Station the plant growth on paper mulch was three times greater in weight and much healthier than on other plots." The above answers our correspondent's question on the subject.

COFFEE-GROWING IN QUEENSLAND.

By A. J. BOYD.

When planting out the coffee seedlings, the main root (the tap-root) should stand straight in the hole prepared for it, for its whole length, and care should be taken that the roots are not tangled. When the plant is in position, the surrounding soil should be firmly pressed by hand. Another important matter is to see that the seedling is not planted deeper than it was in the seed-bed or flower-pot; otherwise the bark above the root will decay.

There is no part of the working of a coffee plantation which demands more supervision or greater care than the planting out, because carelessness in this work is not in immediate evidence, but may injuriously influence the thriving or weakness of the future tree. For this reason quick planting and cheap work are eventually dear, and only reliable white workers should be entrusted with this most important labour. It is true that young coffee plants are tough and resistant, but that should be no reason for mishandling them; wherefore the casual losses will be less and the duration of the plant's life longer in proportion to the care taken at the outset.

For the first few days, or even weeks, after planting out, the young trees should be protected from the full heat of the sun by leafy bushes or by a small board placed slantwise in the ground at a little distance from each tree. This may seem troublesome work, but it eventually pays. At intervals of three weeks, and, later, of six weeks, after planting, the young trees should be examined, and sickly or shrivelled ones replaced by healthy plants. It is needless to impress upon the young coffee-planter the necessity for keeping down weeds. For this purpose there are still some planters who prefer to use the old, out-of-date hand hoe of their ancestors, holding the belief that the use of horse-drawn implements is injurious to the trees; but common sense should teach the lesson that the most expensive work on the plantation is the result of the use of the hand hoe, whilst the most efficient work is that done by modern ploughs, cultivators, and harrows.

When the trees have reached the age of between 2 and 3 years, it is time to decide whether they should be topped or allowed to grow to their natural height. Both of these methods have their advantages and disadvantages, and that which may be advantageous in one district may not be suitable for another. There are three objects to be attained by topping and pruning, of which H. Semler, in his work on "Tropical Agriculture," says:—

"These are:—First, heavier bearing; secondly, facility of picking; and, thirdly, protection against high winds. As regards the first point—namely, heavier bearing—there is no doubt that by judicious topping and pruning the crop for the first year or for a series of years can be considerably increased. But experienced planters have, for some time, taken the view that the early increase in the yield of berry can only be obtained at the cost of shortening the life of the topped trees, or of the yield in later years, and that, eventually, when the returns for a series of years are taken into consideration, it is much more profitable not to top the trees."

The pruning of coffee trees is not much practised in South America, but is continued in Southern Asia, in which country not only larger crops were the result, but increased facility for gathering was obtained. Of late, however, even in the

latter country, the trees are allowed to grow freely and naturally, and the planters are quite satisfied with the results.

Notwithstanding this, if, where much topped and pruned coffee is seen, one asks for the planter's reason for this, he receives the reply:—"We would allow the whole of the trees to go untouched if sufficient labour were obtainable at picking time, but since that is often unattainable, and since the picking from untopped trees is more laborious and inconvenient than in the case of trees about 6 feet high, much of the coffee falls to the ground and is lost for want of labourers."

On the other hand, the topping and pruning also demand more labour, and this is done at a different time between the picking seasons, and then, by this arrangement, we manage a suitable distribution of work throughout the year.

In Ceylon, the trees were, and still are, kept to a very low growth. On most of the plantations the trees are topped to $1\frac{1}{2}$ yards in height, and often, as I (the writer) saw during my two visits to Ceylon, to a height of $1\frac{1}{4}$ yards, and even 1 yard was common.

Having, then, decided on topping, and at what height, the planter must wait until the main stem has become brown and woody. There is no need for anxiety about the top, as a mistake is easily corrected. If, for example, it were cut off too high up, the main stem can be cut back at any time, and if too low down, on the other hand, a young shoot near the top can be allowed to grow near the main stem. After the topping, the main stem constantly sends out young shoots, and these must be rubbed off by hand shortly after they appear. When this has been done, the remaining branchlets should be paired; that is to say, one of the two opposite shoots near the top can be allowed to grow near the main stem, and then be cut off, changing from left to right and right to left, and all branchlets which cross each other must be cut off.

It is hardly worth adding that this theoretical work cannot be actually carried out in practice, and one must be content with some such approximate assistance to the main stem.

In the case of Liberian coffee, the methods here given—to keep the trees somewhat dwarfed—cannot be profitably adopted. The growth of the Liberian coffee tree is so vigorous that when it is attempted to keep it low by force, the result is a rich tangle of thriving branches and leaves, instead of a heavier crop of fruit.

Some years ago I grew a considerable number of coffee trees, some of which I topped, whilst others were allowed to carry on their natural growth. When the trees bore, I found that the topped trees bore earlier than the latter, but I cannot remember that there was any difference in the yield, which was very heavy. I had no means of pulping the berries, beyond crushing off the pulp in a gunny bag. The beans dried with the parchment skin were sent to a factory, where they went through the necessary process and returned to me in the shape of excellent coffee, which supplied the household wants for some time. I started a coffee plantation at Lawnton, on the Pine River, but constant dry weather had such a bad effect on all vegetation for a couple of years that I gave up the farm and never heard any more of my coffee trees, although, perhaps, some may still be living in the botanic gardens at Lawnton.

IMPROVING THE QUALITY OF COTTON AND THE INCREASE OF ITS YIELD.

COMPILED BY A. J. BOYD.

In view of the reported decrease in the quantity and quality of cotton grown in the United States of America and in Egypt, during the year 1919 and previous to that time, the Ministry of Agriculture of Egypt specially invited the Director of Agriculture in the United Provinces of India, Mr. Martin Leake, M.A., to visit Egypt to make recommendations for the improvement of the quality of the cottons grown in that country, and for increasing the yield. Mr. Leake accordingly paid two visits to Egypt, and furnished a report embodying many valuable suggestions to that end. His recommendations with regard to the cotton industry in Egypt are equally applicable to Queensland's conditions, especially his references to the necessity for raising pure seed. This is a most important matter in connection with cotton-growing in Australia to ensure good prices in the British cotton market. Although cotton has been grown in Queensland for many years, there has, in the past, been little attention paid to the raising of pure seed. Much of the cotton grown here was then raised from mixed seeds, with the result that the highest price

was not received for the ginned cotton exported to England, owing to its want of uniformity in length and the strength of the fibre. Mr. Leake said, in his report, that the cotton produced in Egypt is, and must continue to be, diverse, and the various classes required to be produced in quantities approximating to the relative demand. Market flexibility may enable new cottons to be absorbed at a high price up to a certain point, but it must not be overlooked that over-production of the high-priced cotton will reduce its price to such a level that it is not profitable to grow it. Distinction should be made between cottons with an intrinsic value and those with an artificial value.

Also, while diversity of class is required, uniformity within the class is essential.

The general opinion of Manchester is that the demand for goods manufactured from the higher grades of cottons, although at the present time mainly potential, is large enough to absorb at its full relative value as much of the long-staple cotton as Egypt is capable of producing. The area in that country suitable for the production of Sea Island cotton is very restricted, and Mr. Leake reasonably holds the opinion that there is every justification for attempting to develop in Egypt a cotton to take the place of Sea Island. He advises that measures should be taken to see that the two factors "price and yield" should be sensibly equal for all kinds grown, and he summarises these measures under the heads of Economic, Botanical, Agricultural, and Commercial.

1. The *Economic*, includes a knowledge of the normal relative requirements of the different classes of cotton, and their normal relative price is essential. Accurate information is also necessary as to the developments taking place in other countries, which are liable to upset the balance.

2. The *Botanical*.—The main lines of work are—

- (a) Selection, with a view to the isolation and maintenance of pure strains of the existent standard cottons, and also to the discovery of new types;
- (b) Hybridisation, which may be looked upon as a *direct* method of evolving new and improved types; and
- (c) Physiological investigation, which is concerned with discovering the exact relationship between the plant and its environment, so that the latter may be controlled, as far as possible, to the benefit of the crop.

3. *Agricultural*.—By this is implied the testing of strains or varieties evolved by the processes of selection and hybridisation, and also the trial of new methods of cultivation suggested by the physiological investigations.

4. *Commercial*.—Some system of seed control is essential, if purity is to be maintained in the stocks of seed produced.

To enable the production and development of special improved strains of cotton to proceed along satisfactory lines, the following organisation is recommended:—

Firstly, the *Botanical Section*, to be engaged on the establishment of pure races and the production of sufficient seed to allow of adequate experimental trial of these types, and for their subsequent multiplication.

For the next stage, an *Agricultural Section* requires developing, which can deal effectively with the trial of the new types produced by the Botanical Section. The whole country should be divided up into a series of circles, based, as far as possible, on "type traits" dependent on environmental conditions. The "circle" officers would each have an experimental farm under their charge, and should also have an intimate knowledge of their district, its capabilities, and requirements.

The stage following the experimental farm is the *seed farm*, which is concerned with the multiplication of the small stocks of pure seeds into a quantity sufficient for distribution to cultivators.

Mr. Leake hesitates to allot the control of these farms definitely to either the Botanical Section or the circle officers, but considers that it is a matter which can only be decided in the light of experience and with due regard to the factor of personal individuality. When the work of propagation on the seed farm is complete, the *Commercial Section* will take over the further control of the seed.

The circle officer in each circle will keep in touch with the cultivators to whom the seed from the seed farms has been issued, and will advise the *Commercial Section* as to their reliability as cultivators. He will inform the ginneries of the names of their cultivators and arrange for their cotton to be ginned separately. The Commercial Section will take over the seed from their crops, mark it with a Government mark indicating that it has been passed as seed to be used for sowing, and issue it, on payment, to growers throughout the district.

This process will take place year after year, fresh seed from the seed farms continually replacing that of the previous year. It is further suggested that the gineries should be licensed for the sale of *taqawi* (seed to be sown), and that the ginners so licensed should assist in distributing seed to cultivators.

The above valuable report appeared in the First Annual Report, 1920, of the Cotton Research Board, Cairo, Egypt. I have considerably condensed it, retaining only those portions which, in view of the almost certain revival of the cotton industry in Queensland, may prove serviceable to our Government in its future dealing with the cotton industry.

SOME NOTES ON FUSARIUM IN THE TOMATO PLANT IN NORTH QUEENSLAND.

By N. A. R. POLLOCK, Northern Instructor in Agriculture.

Occurrence.—Some five or six years ago, this malady was first noticed in the Bowen district, where the tomato is cropped annually over considerable areas. In this district it is now of general occurrence, and few areas, even on virgin soil, are free from it.

At Townsville and in Cooktown it has also been noticed, but other areas where tomatoes are grown for market, such as Guthalungra, Gumlu, Cloncurry, Charters Towers, Cape River, &c., appear to be free.

Description.—The malady is caused by a fungus of *Fusarium* species, which invades the roots and spreads through the vascular tissue, up the stems and branches, and is evidenced, on cutting through a stem or root, by a brownish discoloration of the fibro-vascular tissue. The first indication of attack is usually noted by a bright yellowing of one or more of the bottom leaves, followed by a wilting of one or more branches. Where the plant has a tap-root, the whole plant will suddenly wilt and die off, but where no tap-root occurs, most frequently, one branch will be first affected, to be followed later on by others, until ultimately the whole plant dies off. The period from the first sign of attack to the death of the plant varies either from the resistance of the plant or from the severity of the attack, and plants may either die immediately or linger on for several weeks.

On examining a plant thus affected, the disease may be traced from the pale green or natural colour of a healthy stem showing the extent of its progress upward in the plant through a darker colouring down into the root affected. Other roots may at first appear perfectly healthy, and those parts of the plants nourished from these roots may be also healthy, the disease being at first confined to one main root and a branch on the same side of the plant served by that root, but ultimately the whole plant will become affected.

Action of Fungus.—The progress of the fungus upwards, so denoted by the brownish discoloration, would indicate that the filaments of the fungus grow through the vascular tissue, breaking down the cell walls and filling them up, thus hindering the flow of sap and causing the sudden wilt of the part affected. A somewhat similar manifestation is seen in the instances of ringbarked trees where the sapwood is cut through.

It is possible that the disease may extend to the fruit, but no external signs, or, for that matter, internal signs, have been noticed with the ordinary pocket magnifying glass to indicate its presence.

Age at which Infection Occurs.—This varies a great deal. The disease sometimes shows a few weeks after setting the plants out, and from then on until after the first picking of the fruit.

I do not know of any instance where the disease occurred in the seed bed up to the time of transplanting, and it is not usual to find the disease in plants left in the seed bed, though neglected.

Volunteer Plants.—Self-sown plants appearing in fields where tomatoes were grown the previous season frequently show no signs of affection, whilst an occasion has been noticed in which every volunteer plant was badly affected. In this case, however, the land was sown to another crop, and there is every probability some damage was done to the tomato roots during cultivation.

Resistant Varieties.—While so far no particular variety of tomato has proved immune to attack, it has been observed that some varieties are more resistant than others. Early maturing sorts, notably "Chalk's Early Jewel," appear more subject than main crop varieties, in which "Burwood Prize" and "Buckeye" are favourites.

Period of Soil Infection.—No data are available as to the length of time the fungus may retain vitality in the soil, in the absence of a host to live upon, but evidence is abundant that the infection becomes greater when tomatoes succeed tomatoes.

DEDUCTIONS.

Seed.—It is apparent that disease is carried on the seeds. The practice of purchasing seed every year, in trying out new varieties from Southern parts and overseas, is common amongst Bowen farmers, and the appearance of the disease in isolated parts where tomato-growing is only occasional, tends to give credence to that view.

Soil.—Soils may have a bearing on the susceptibility of the plant. On the coast, where the disease has only so far manifested itself, acidity in the soil is common, while inland soils are usually neutral or slightly alkaline. At Bowen, where the disease has been under observation last season and this upon over seventy farms inspected, it has been noticed that there is no perceptible difference in the resistance of plants growing on the many different classes of soil, from the heavy black to the light sandy alluvials, which, to the best of my belief, are all more or less slightly acid.

It has been noted that seed probably carried spores of the fungus in the first instance, but when plants are set out and portion is healthy and portion affected, it is apparent that disease can be contracted through the soil.

Instances have been noted where plants from the same seedbed on virgin soil have contracted the disease when set out in old soils. Also, occasional instances of diseased plants have been noted where plants raised from seed from a disease-free district, in seedbeds on virgin soil, were set out in absolutely virgin soil.

It is evident that the fields on which diseased plants have grown carry infection, and that this infection can be carried to other soils by cultivating implements or other mechanical means.

How Infection Occurs.—As previously noted, infection probably occurs in seed. It may also develop in the root of the seedling, but I am inclined to believe that entry is more often obtained through damaged roots, in lifting from the seedbed, or from cultural implements afterwards. Observations on lightly affected plants incline to this view when, in tracing the disease down into the root, the darkest portion of the discoloration has been found to occur where the root has been damaged, while further on, to the end of the root, the fungus did not appear to have extended. Last season, when setting out, the roots and stems of plants, as far as the bottom leaves, were dipped in a solution of 1 part copper sulphate to 500 parts by weight of water, with a view to sterilising the broken rootlets, and at the same time they were watered with the same, or a weaker solution. Although complete immunity was not gained, it was noted that treated plants were longer in developing the disease than untreated.*

If the entry of the fungus is facilitated by damage to the roots, it is probable that these plants contracted the disease after the roots had grown beyond the soil in which the fungus spores should have been killed by the watering with the bluestone solution, and that then had received damage from cultural implements.

Were it only possible for the plant to contract the malady from injured roots, it might be possible, by treatment, to keep the plants free, and by a rotation of crops, to kill the fungus out by starvation.

Once contracted, it is apparently absurd to attempt curative measures on the plant, even if such could be successful, whilst a sterilisation of an affected soil by mechanical means would appear too expensive, especially when reinfection could so easily occur.

A rotation of crops naturally is suggested, and this, in my opinion, will be the prime factor in disease control. It may be found later that the influence of one or more particular crops may have a greater effect than others in lessening soil infection, especially if such are ploughed under. The sweetening of the soil by liming and increasing the amount of plant food by applying fertilisers to ensure a vigorous growth are necessary operations, more conspicuous in their neglect than otherwise amongst Queensland farmers.

In addition to the foregoing, and equally as important, will be the raising of disease-resisting strains and more careful attention to seed selection.

*Where plants were not dipped in this solution many were lost by cutworms, but in no instance was their attack manifested on plants that had been treated.

The view is often expressed that no person can select seed better than the farmer himself, and the spread of *Fusarium* to Bowen and other parts of North Queensland, must be directly traceable to infected seed raised elsewhere. Given a proper system of fertilising, rotation of crops, and special varieties, the use of copper sulphate in sterilising wounded roots, and the systematic spraying of the foliage, the tomato should remain a most remunerative crop in Bowen and other centres of the North.

THE BLOWFLY PEST.

REPORT OF THE SPECIAL BLOWFLY COMMITTEE, INSTITUTE OF SCIENCE AND INDUSTRY.

HISTORICAL NOTE.

When the Director of the Institute of Science and Industry (Mr. G. H. Knibbs) was in Brisbane recently, he instructed the local Special Blowfly Committee to furnish the Press with a comprehensive review of the experimental work which has been carried out in Queensland. The subject is a very important one to the pastoral industry, and a very great deal of research and experiment has been devoted to it in the effort to find a method or a specific which will relieve the prime industry of the Commonwealth from its greatest menace. The committee, therefore, has decided to issue all the useful information at its command in the form of short articles, dealing with their investigations into the different phases of the problem. The investigations will be considered under the following headings:—

1. The beginning and effects of the pest.
 2. Measures taken to combat blowflies—
 - (a) Department of Agriculture and Stock;
 - (b) Institute of Science and Industry.
 3. Methods of destroying flies—
 - (a) Traps and poison bags.
 - (b) Parasites and natural enemies.
 4. "Jetting."
 5. Dipping.
 6. Conclusions and recommendations in considering the data given above.
- The present article combines Nos. 1 and 2 of the series.

EFFECTS OF THE PEST.

For very many, probably hundreds of, years sheep flies have been known to British sheep-farmers, yet it has not been, nor can it be, the serious problem in Britain which it is in Australia. Where they are comparatively small flocks, say, under a thousand head, it is an annoyance. Here, where the numbers range from thousands up to hundreds of thousands, the fly pest is a menace, the losses from which in the past ten years have run into millions of pounds sterling. In Britain, too, there is a respite every year owing to the presence of snow and ice for several months, while in Queensland especially, flies are in evidence whenever there is a fall of an inch or two of rain, whatever the season of the year. Last winter, for instance, flies were very active on Dalmally. Therefore we cannot use British experience under Australian conditions. We must work out our own salvation. Whether we have done so or not will be seen later.

As was pointed out by Mr. W. W. Froggatt, of New South Wales, in his "Bulletin No. 5, on Sheep Maggot Flies," rams' heads have been blown "since far distant days." In Queensland rams' head blankets, saddlecloths, wool bales, &c., have been attacked by flies for the past forty years at least, but it was not until about 1896 that lambs' tails were noticed to be attacked, thus necessitating dressing. Then came a series of dry years which culminated in the big droughts of 1900-1902, when Queensland lost over ten millions of sheep. All the losses were put down to drought, yet it is possible that flies may have taken their quota. In any case, from 1902 on to 1913 fly attack became more and more severe, until in the latter year reported losses were so great that the Government deputed Mr. A. H. Cory, M.R.C.V.S., and Mr. Edmund Jarvis (Assistant State Entomologist) as a Commission to inquire into the matter. With them was associated Mr. W. G. Brown (State Sheep and

Wool Expert). They visited the Longreach, Peak Downs, and Springsure districts. Forty pastoralists, representing over one million of sheep, were visited, and results showed that an average of 23 per centum of the sheep had been struck. Five stations had from 40 to 70 per cent. affected. In Messrs. Cory's and Jarvis's report, "Sheep Maggot Fly Pest, October, 1913," a recommendation was made that the State should establish a set of experiments to try and find a specific or a method of dealing with the problem. This recommendation was adopted, and in 1914 650 ewes were purchased and taken to Gindie State Farm, in the Emerald district, Central Queensland. Here, in the course of four years, trials of numerous dips, dressings, fly traps, and other methods of combating the fly were tried under field conditions. Among all the dips and dressings tried none was found effective except it was poisonous, and even then effective for a short period only. Traps were tried with a certain amount of success as far as catching flies in large numbers was concerned. The Orion Downs method of jetting a poisonous dip was also tried, with a success which gave hope for something better in the future. All these trials will be discussed in detail in their place. At the close of 1918 the Institute of Science and Industry appointed a Special Blowfly Committee in Queensland, and the experiments at Gindie State Farm were handed over to that body.

COMMONWEALTH INSTITUTE.

At the latter end of 1917 the Commonwealth Institute of Science and Industry decided to put aside a sum of money to be devoted to the investigation of the problem of combating the blowfly pest in the Commonwealth. In February, 1918, a Queensland Committee was appointed by the then Director (the late Dr. Gellatly). It consisted of Messrs. S. P. Fraser (representing the pastoralists), A. H. Cory, M.R.C.V.S. (Chief Inspector of Stock), J. B. Henderson (Government Analyst), and W. G. Brown (State Sheep and Wool Expert), who at that time was in charge of the Gindie experiments. An announcement was made in the Brisbane Press that a suitable station was desired on which to operate. The Committee was very fortunate in receiving an offer through Mr. J. M. Hunter, then Minister for Lands, from Mr. W. A. Russell, of Dalmally Station, Roma. The station was inspected by the Committee, who found that it was eminently suitable. Mr. Russell was very enthusiastic, and it was owing a good deal to his public spirit and generosity that the way was made smooth for the experiments. At his own expense he installed a shower dip, a 60-ft. swim dip, a jetting plant second to none in the State, and furnished as many sheep as were required, with yards, &c., for the working of the experiments. On acquiring these facilities the Committee decided to work on the lines which, on the strength of results of the Gindie experiments, had been found the most promising. These were the use of poisonous dips, the use of jetting plants after the method of Orion Downs, the trying out of fly traps, &c., and the study on the entomological side of flies and parasites. For the latter purpose an entomologist was appointed to take charge of the scientific side of the problem. When the Dalmally experiments were in full operation the State experiments at Gindie were suspended. It has been said that experiments since 1914 have been very slow in achieving results, but it must be remembered that since the fly became very serious, fifteen years ago, the whole pastoral community has been working, mostly in the dark, towards control of the pest, and unsuccessfully. Necessarily there has been much groping in the dark since the beginning of experiments. Then, again, there have been several breaks of continuity during the dry years, when flies were quiescent. However, enough has been done, and many lessons have been learnt, both from the practical and scientific side, to warrant the committee in saying that there is a strong hope that the evil can be controlled, and at a reasonable cost. The above is a very bare outline of the work attempted in Queensland, and it remains now to give in detail the operations themselves with all available information.

METHODS OF DESTRUCTION.

The following notes deal with methods of destroying flies—

- (a) By traps and poison bags.
- (b) By parasites and natural enemies.

Traps.—Traps were first used about nine years ago, when they were advocated by Messrs. Cory and Jarvis. Claims were soon made by persons interested that the fly pest could be controlled and blowflies eventually exterminated by means of traps. Many styles were put on the market, together with different lures; and, when first tried, the enormous catches of flies led the pastoralists and others to believe that this means was likely to be successful. The result of this belief was the installation of thousands of fly traps throughout the country; but it was soon seen that, although the catches in most cases were large, the effect upon the number of flies was not noticeable, and that the paddocks where trapping was in vogue had practically as many sheep struck as those where no traps were set.

From careful observations, we were forced to come to the conclusion that trapping was, firstly, not practicable on a large scale owing to cost, and, secondly, that it had no appreciable effect on the number of flies in the paddock. The reasons for statement No. 1 are—

- (a) Baited traps become very much less effective three or four days after being set;
- (b) There are no lures which are effective over a length of time;
- (c) To be of any value at all the traps must be very close together, as the fly seems to be very local and does not appear to travel very far from its seat of origin;
- (d) The labour attached to baiting and attending traps is considerable and expensive, and not a position much sought after by the available labour, and unless the traps are attended to daily they soon become ineffective.

Spiders spin webs across the entrances, the baits become unattractive, while rain spoils most of the traps, necessitating emptying and rebaiting.

With regard to the second reason, when traps are working well and are well attended to, the flies appear to be just as numerous as ever within a short distance of the trap, and it seems impossible to have them close enough to catch most of the flies.

Poison Bags.—With regard to poison bags, these were found to be practically valueless. The baits soon become unattractive and hard, and only when freshly poisoned do they catch many flies. Poisoning of dead offal is, however, a good means of destroying a great number of flies. It has been found at Dalmally that a mob of sheep jetted with arsenic will kill more flies than all the traps or poison bags set about the yards. After jetting, flies are always to be seen dead in great numbers about the yards and shed.

Parasites.—Apparently the best controller of the fly is the chalcid wasp. There are several different species known, the most common being the *Nasonia brevicornis*; the other species are scarcer. The *Nasonia brevicornis* is practically always present, and can be obtained by taking pupæ from any carcass or offal and allowing them to hatch out in a glass jar with a stopper of cotton wadding in the mouth, or a piece of cloth tied over it. It can easily be ascertained, by counting, what percentage of the pupæ hatch out chalcids or flies. But while the chalcid wasp has been found nearly all over Queensland where sheep are stocked, the fly pest has been steadily increasing. At the beginning of any fly attack, only about 25 per cent. of the pupæ are found to be parasitised; that is, every fourth pupa is breeding out from ten to twenty wasps instead of one blowfly. On the other hand, towards the end of a fly attack, over 80 per cent. of the pupæ have been found to be parasitised; that is, at least four out of every five pupæ are breeding wasps—about a dozen wasps each; the fifth is producing one blowfly. These considerations led us to think, at an early stage of the investigations, that the cultivation and distribution of the wasps would prove a very important factor in checking the flies. Investigations later on, by Professor T. Harvey Johnston and Mr. O. W. Tiegs at the Queensland University (see "Queensland Agricultural Journal," March, 1922), showed that the chalcid wasp in question only attacks those pupæ which are exposed on the surface, as it cannot burrow underneath. Unfortunately, the majority of the maggots burrow before pupating, these pupæ being therefore beyond the reach of the wasp. This probably explains why the chalcid wasp has not played a more important part than the early investigations forecasted, as the statistics then obtained only applied to pupæ found on or near the surface, where the wasp could most likely get at them. Other parasites than the chalcid wasp (*Nasonia brevicornis*) are known, one of which attacks the maggot before it pupates. Much investigation, however, into the life-history of these parasites requires to be done before a definite scheme of utilisation of them can be devised. It promises, in the long run, to be the cheapest and most effective control of the blowfly pest. At present not nearly sufficient is known to offer any immediate relief. Owing to lack of funds, investigations are not being made in this direction by the Committee, but valuable work is being done on flies and their parasites by members of the Biological School of the Queensland University.

Natural Enemies.—Birds are most useful in destroying pupæ and the flies themselves. In Queensland, in sheep-grazing country, bird-life is not over-plentiful, but there are several species that are of great use. They can be classed under two headings—

- (a) Those that clean up all offal and carcasses; and
- (b) Those that feed upon the pupæ and flies.

We have, of those that clean up the carcasses and offal, hawks, scavenger kites, and crows; and those which take the flies and pupæ include the magpie, peewee,

swallow, willie wagtail, and several others. The most useful and persistent of these appears to be the willie wagtail, which eats flies, maggots, and pupæ. They follow the sheep about when feeding and alight on their backs, catching the fly when attacking the sheep. However, the natural enemies, like the parasites, do not prevent recurrent bad attacks by blowflies.

To sum up, it does not appear as a result of our investigations, so far, that either traps or poison bags are ever likely to prove an effective or economical means of dealing with blowflies on our large grazing areas. With regard to parasites, although a most promising method of attacking the problem, no parasite is at present known which is likely to be an important factor in the control of the pest. It must be remembered, however, that this is by far the most economical method of attack, and it is earnestly hoped by the Committee that funds will soon be made available from some source for a systematic investigation along this line of attack. The protection and encouragement of bird-life, particularly of the insectivorous birds, while not by any means a solution of the problem, is at least a factor which should not be neglected.

The succeeding articles will deal with dipping and jetting, and the last of these articles will be practically a résumé of each.

FRUIT FLY INVESTIGATIONS.

[THIRD PROGRESS REPORT.]

By HUBERT JARVIS, Entomologist in Charge of Fruit Fly Investigations at Stanthorpe.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the Third Monthly Report of Mr. Hubert Jarvis, dated 16th May, 1922.

WINTERING OF FRUIT FLY.

The Queensland fruit fly *D. Tryoni* is still occasionally to be met with in the Stanthorpe district during the warm hours of the day (i.e., between 11 a.m. and 4 p.m.) in the vicinity of packing sheds, or in any such situation where fruit is stored. It is, however, but rarely seen at this time of the year in the orchards, nor has it been observed sheltering in the packing sheds.

The majority of the fruit flies kept in captivity in the laboratory are still alive, although a number have succumbed, most probably owing to the low temperature obtaining at night and early morning during the last ten days. Frosts have, in fact, been experienced for several consecutive nights.

Fruit flies subjected to outside (natural) conditions at night had apparently perished when examined in the morning; but in nearly every case they have revived on being warmed by the sun. The female fruit fly seems less able to stand cold conditions than the male, casualties due presumably to this proving to be almost invariably those of females.

No indication of the fruit fly's hibernating as a mature insect has so far been noticed.

PUPATION OF FRUIT FLY.

Location.—Pupæ have recently been found in the ground, below cases of stored apples and quinces, and these pupæ have so far, failed to give rise to flies. It seems probable, then, that a small percentage may winter in this condition, in or under the packing sheds.

Fruit fly maggots do not necessarily always require access to the soil to enable them to turn to the pupa or chrysalis, for they will complete this change in any dry corner of a shed, packing case, or even when wrapped in paper. Usually, however, the instinct of the maggot seems to direct it to the soil, and it will squeeze, almost miraculously, through the smallest crack in its effort to reach the ground.

The soil under the wooden floor of the packing sheds (in many cases the soil is the floor) is generally both very hard and dry, and the maggots would, in gaining it, have to content themselves with about a quarter of an inch depth of dry dust in which to pupate.

Darkness.—The need of darkness is probably a governing factor in this persistent effort of the maggot to reach the soil—i.e., to get under cover away from the light.

The majority of a number of full-grown maggots, taken when just emerged from the fruit and kept in a shallow box and exposed to full light, failed to complete the change to the chrysalis for from ten to twelve days. On the other hand, similar maggots confined at the same time in a dark box, without soil or any cover, all pupated within twenty-four hours.

Temperature.—This is also undoubtedly a very important factor in determining the duration of the pupal period. Thus pupæ under observation in the laboratory as winter proceeded, gave the following results in transformation:—

Host.	Date of Pupation.	Date of Emergence.	Number of Days.
Apple	16 February, 1922 ..	22 February, 1922 ..	6
Apple	28 February „ ..	8 March „ ..	8
Apple	7 March „ ..	18 March „ ..	11
Quince	20 March „ ..	14 April „ ..	25
Pear	6 April „ ..	13 May „ ..	37
Apple	20 April „ ..	None to date	..

Note.—No fruit flies have emerged since 13th May, 1922. (Instruments were not available for the determination of the temperatures obtained during the periods mentioned.)

PERSISTENCE AS MAGGOTS.

Fruit-fly maggots are still present in stored fruit, although specimens under observation therein are very inactive, the temperature of the fruit, away from the sun, remaining very low all day.

SEASONAL ABSENCE.

Although probably not actively present in the Granite Belt area during the winter months, it is possible that the fruit fly may be met with then at a lower altitude than at present, and it is hoped to secure information relating to this possibility at an early date. The importance of safeguarding the fruit industry by “cleaning up,” not only in our own district, but also in adjacent ones, where fruit trees are also grown, can hardly be too much stressed. Should the fruit fly be (as is quite likely) a seasonal visitor to this district from over the border, then adjacent orchards, if neglected, would be a very serious source of infection, and would, moreover, render partially ineffective the watchful care and cleanliness which we sincerely hope will be the aim of every orchardist in the coming season to preserve and exercise.

COLD STORAGE OF FRUIT.

A question—certainly one of very much interest—is that of subjecting fly-stung fruit, especially in the earlier stages, to the influence of low temperature (*i.e.*, cold storage) in order to kill the eggs and maggots of the Queensland fruit fly (*D. Tryoni*).

One experiment in this connection was originated by Mr. A. H. Paget, of The Summit. Mr. Paget sent ten cases of fly-stung apples (in which the maggots were mostly fairly well developed, but in which, also, both the eggs and young larvæ were represented), to Sydney, N.S.W., and had them subjected (in cold storage) to a temperature of from 33 to 34 deg. F. for a period of three weeks.

On their arrival, on being returned to Stanthorpe, a number of these apples were examined (about fifty) in this Office, and in every case, the maggots encountered therein were found to be dead, and had apparently been so for some time, as most of them were black and decomposed.

This certainly seems a step in the right direction, and were destruction by this means generally possible, such procedure should obviate the danger of fruit developing maggots from contained eggs after leaving the district, and when in the shops in Brisbane, or other centres, which so often happens with “stung fruit.” A very much shorter time for submission to cold than three weeks would, however, probably be found effective.

(The results obtained by Messrs. E. A. Back and C. E. Pemberton, who recently carried out experiments in subjecting the eggs and larvæ of the Mediterranean fruit fly (*C. capitata*) to cold storage temperature in Honolulu, Hawaiian Islands, are as follow:—“No eggs or larvæ of the Mediterranean fruit fly survived refrigeration at 40 deg. to 45 deg. F. for seven weeks, at 33 deg. to 40 deg. F. for three weeks, or at 32 deg. to 33 deg. for two weeks.” (“Journal of Agricultural Research,” vol. v., No. 15.)

Experiments in this direction could be carried out in regard to our own fruit fly (*D. Tryoni*), and there is every reason to suppose that very similar results would be obtained.

Provided that it is an assured financial proposition to establish in the Granite Belt a central cold storage plant, it does not seem too great an assumption to conclude that such a cold storage must prove a very valuable asset to the district from the point of view that the results of these experiments constitute.

OTHER INJURIOUS INSECTS.

Grain Weevil.—An insect which is causing a certain amount of damage to stored apples is the "Grain Weevil" (*Calandra Oryzae*), a member of the Fam. Curculionidae. This little beetle mines and tunnels in the fruit, chiefly at the calyx end, causing a disfigurement of the apple, and probably also rendering the subject of attack more liable to the development of fungus troubles.

It has not so far, however, been known to damage fruit in the orchards, and is usually present only in apples exhibiting some mechanical injury.

Thrips.—An instance of these minute and interesting insects attacking garden shrubs (*Lauristina* sp.) was brought under my notice by Mr. J. Rudder, of Stanthorpe. The insect in question is probably an introduced one (*Heliothrips* sp.). It has, so far, not been met with on any economic plant or tree in this district. Should it be so discovered, it can be dealt with by spraying with a miscible oil, tobacco extract, or kerosene emulsion.

CASE MOTHS.

Psychida.—The case or bag worm moth (*Thyridopteryx lubnerii*) has been found doing a great deal of damage to pines (*Pinus insignis*). Examples of these trees may be seen covered with their neat little caterpillar-cases made of pine needles, and having almost the appearance of small pine cones. This pest has also developed a taste for apple foliage. A lookout, therefore, should be kept for it in the orchards. It can, fortunately, be very easily both seen and dealt with.

Psyllidae (Lerp Insects).—Specimens were submitted to this Office by the Editor of the "Border Post" for identification, and proved to be examples of one of a group of insects known as *Psyllidae* (Genus *Thea*).

These curious sap-sucking insects, of which a short account (by the writer) appeared in the "Border Post" (5th May, 1922), happily confine themselves for the most part to our native flora. A European exception, however (*Psylla mali*) is injurious to the apple and causes a good deal of damage.

GRUBS IN PUMPKIN.

From the above source, again, were received a number of dark-brown segmented grubs found in decaying pumpkin. These were examples of the interesting maggot or larval form, of one of the stratiomyid flies (*Neocaxireta spinigera*). These flies usually breed in decaying vegetable matter, and are in no way responsible for any primary injury to fruit or vegetables. This fly is quite abundant in the district.

FUNGUS AND OTHER DISEASES.

Several troubles of obscure origin have been sent to this Office and have been referred to the Government Entomologist and Vegetable Pathologist, Mr. Henry Tryon, whose reports on the same have been duly received and have (by the courtesy of the Editor, Mr. J. Scully), been printed also in the "Border Post" of 12th May, 1922, for the benefit of orchardists and others.

PROJECTS ARISING FROM SEASONAL ABSENCE OF FRUIT FLY.

The carrying out, very shortly, of personal inquiries in the entire surrounding country of the Granite Belt area is contemplated. Thus it may be possible to locate the nearest point to this district at which the fruit fly occurs at this season of the year. Reports have reached this Office of an abundance of native fruits growing in the scrubs lying beyond the Queensland border, notably the Taboom Scrub, N.S.W., and it is our purpose to verify, or otherwise, these reports at an early opportunity.

OFFICE WORK.

Some time has been spent studying structural and other differences shown by the two fruit flies *Bactrocera Tryoni* and *B. Tryoni*, var. *solani*, and results arrived at should, when published, prove helpful to those who are interested in distinguishing these insects.

I am indebted to the following orchardists and others for specimens and material:—Dr. S. J. Roberts, Dr. Hurworth, Mr. J. Sewell, Applethorpe; Mr. A. H. Paget, The Summit; Mr. L. H. Flood, The Summit; Inspector F. Williams, Mr. F. Sellars, and Mr. J. Rudder, Stanthorpe.

Visits of inspection have been made to the following districts during the month:—Glen Aplin, Spring Creek, Diamond Vale, and Eukey.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MAY, 1922.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Gay Lassie ...	Ayrshire ...	20 Feb., 1922	960	4.3	48.30	
Prim ...	Holstein ...	6 Feb. "	1,050	3.2	39.00	
College Cold Iron	Jersey ...	25 Jan. "	576	5.4	35.30	
Little Buttercup...	Holstein ...	12 D.c., 1921	780	3.5	31.80	
Magnet's Leda ...	Jersey ...	8 Feb., 1922	540	5.0	31.80	
Skylark ...	Ayrshire ...	7 Feb. "	630	4.1	30.20	
Auntie's Lass ...	"	31 Oct., 1921	589	4.1	28.21	
College Prima Donna	Holstein ...	17 Nov. "	630	3.7	27.30	
Snowflake ...	Shorthorn...	20 Feb., 1922	630	3.7	27.30	
Lilia ...	Ayrshire ...	3 Mar. "	540	4.1	25.80	
Lute ...	"	8 Jan., "	600	3.5	24.30	
College Evening Glow	Jersey ...	11 Oct., 1921	330	6.1	23.70	
College Ma Petite	"	5 Feb., 1922	450	4.5	23.70	
Glow VI. ...	Guernsey ...	28 Aug., 1921	403	5.0	23.56	
Confidante...	Ayrshire ...	8 May, 1922	384	5.2	23.52	
College Nita ...	Holstein ...	26 Feb. "	540	3.7	23.40	
College B uebell ...	Jersey ...	22 Oct., 1921	420	4.7	23.10	
Sheila of Nundorah	Guernsey ...	16 April, 1922	420	4.7	23.10	
Buttercup ...	Shorthorn...	28 Oct., 1921	540	3.4	21.30	
College Wildflower	Jersey ...	10 Dec., "	390	4.7	21.30	
College Promise ...	"	6 Jan., 1922	390	4.5	20.70	

GRAPE CULTURE IN QUEENSLAND.

By ALBERT H. BENSON, M.R.A.C., Director of Fruit Culture.

PART II.

In the June number of the *Queensland Agricultural Journal* questions dealing with the suitability of different types of grapes for different parts of the State, soils suitable for grape culture, the preparation of land for the vineyard and the planting of the vineyard were considered, and we now come to

THE PROPAGATION OF THE GRAPE VINE.

The vine is one of the easiest plants to propagate, and yet it is by no means uncommon to meet with cases where there has been very little success and a bad stand of plants has been the result. The failure, in practically every instance, is due to lack of knowledge, and it can be obviated by carefully following the advice given below:—

Vines can be propagated by seeds, by cuttings containing several eyes or only a single eye, or by layering, and the plants so produced can either be used for the production of fruit or for stocks on which to graft or bud selected varieties. Growing vines from seed is not a matter for the commercial vigneron, but rather for the expert horticulturist who wishes to raise a new variety, and may, therefore, be put on one side.

Propagation by means of cuttings is the method commonly employed, and the cutting consists of a portion of the previous season's growth that is well matured and short-jointed so that there is no great space between the eyes. The cutting should be about 16 in. in length and no more; the use of cuttings of from 2ft. to 3 ft. in length, of which the bulk is left out of the ground, is one of the surest ways to bring about failure.

If the whole of the wood on the vine has matured properly it can all be used for cuttings if required, but it is always best to take the cutting from the older portion of the cane—that nearest to the old wood—as it is always the best matured and the surest to strike.

The canes to be selected for cuttings should always be of the last season's growth, free from anthracnose or downy mildew and grown on vigorous and heavily producing vines. (See Fig. 1.)

When the vines are pruned, the prunings should not be allowed to lie about for days in the vineyard if they are required for cuttings, as if they do so in dry weather for any length of time their vitality is seriously injured and a large percentage fail to strike.

Cuttings should be made as soon as the vines are pruned, or if this is not possible, with no more delay than is absolutely necessary. To prepare the cutting, a clean cut is made with a sharp knife or secateur, just below a joint, as if this is done the cut surface will soon callouse. The cutting is then heeled in or planted, after having been cut to the desired length by making a clean cut just above a joint, or, if wished, through the next joint above the top bud left on the cutting. By doing this there is less chance of the cutting dying out from the top cut.

If wished, a small portion of old wood may be left at the base of the cutting, but of course this can only be done with the base cutting on a cane when a portion of the previous year's wood has been pruned away with it.

Cuttings should be tied into bundles of convenient size, and either heeled in at once or be carefully packed if to be sent any great distance. Every care must be taken in heeling in and packing to see that the cuttings do not dry out, as once they become dry their vitality is seriously injured and many blanks will occur in the vineyard. If properly heeled in when fresh, they will keep in good condition till needed for planting and there should be very few, if any, misses.

Cuttings are either planted out in their permanent position in the vineyard, which I strongly advocate, or they are planted in nursery for a year and are then transplanted to their permanent position.

They are then known as rooted cuttings, and require much greater care in handling than unrooted cuttings, as they dry out rapidly if exposed to the direct rays of the sun or if carelessly handled or packed. Rooted cuttings, when removed from the nursery, should have all their roots other than those at the base of the cutting removed and the base roots shortened to a few inches in length. All the growth of wood that has been

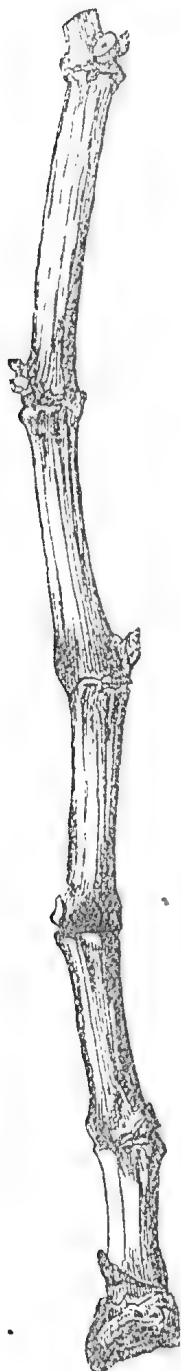


FIG 1.—Perfect
Vino Cutting.

made during the previous season should be pruned back to two eyes at the outside, and the cutting is then ready for planting, as previously described.

The removal of the surface roots causes the vine to root deeply, and there are no roots to interfere with the thorough and deep cultivation of the soil so essential to successful grape culture especially in the hotter and drier parts of the State. The hard pruning back of the wood growth encourages the production of strong new canes, one of which, no matter what type of pruning is subsequently followed, will form the main stem of the resultant vine.

Propagation by means of single eyes is seldom used here, and is therefore only mentioned as a method in vogue in other parts, and then mainly in connection with hot-house culture. Propagation by means of layers is also seldom resorted to, the only occasion in which it is found useful being where there are blanks in a bearing vineyard that it is desirable to make good. Cuttings or rooted cuttings seldom thrive if planted under these conditions, and it is found that the quickest way to fill the blanks is to take a long cane from an adjacent vine, bury it in a trench dug from it to the blank space the vine is required to fill, and bring the cane to the surface there. The cane is still attached to the parent vine, and when it is well established on its own roots it can be cut away from it.

RESISTANT STOCKS.

Several varieties of American and hybrid American-European grapes are more or less resistant to the attack of phylloxera, so much so that, although by no means immune to the attack of this insect, their root-systems are so hardy that they are not seriously injured. As a result, these resistant varieties are used as stocks on which to graft the varieties of commercial grapes it is desired to grow. Most varieties of resistant vines are of no value whatever for the production of fruit, but a few are direct producers, usually of very second-class quality fruit, and are therefore only used as stocks.

A cutting of a resistant vine can be whip- or splice-grafted with a scion of the variety of grape it is desired to propagate, and this work can be done easily and rapidly on a bench or table in a shed or other convenient place. The method adopted is described by Mr. C. Ross, as follows:—

“The whip-tongue graft is best practised on young vines or cuttings, and is performed as follows:—The stock and scion should be of the same diameter. A clean sloping cut is made slightly above the node of the stock, and a corresponding one below the node of the scion. The closer these cuts are made to the nodes the better, for it is near these points that the most of the knitting tissue is formed, and a more perfect union is the result. (See Fig. 2.) A short parallel slit is made about a quarter to half an inch deep, corresponding in each face of the splice. The slit is slightly opened by a turn of the knife to facilitate the insertion of the tongue. (See Fig. 3.) The larger area of cut surface thus brought into exact juxtaposition produces a greater amount of callous or knitting tissue. After being brought together, the splice is kept firmly bound with a ligature of raffia or soft twine.” (See Fig. 4.)

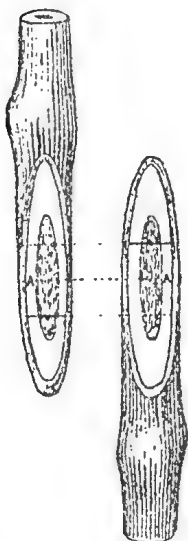


FIG. 2.—How Stock and Scion are cut for W.T. Graft. Centre dotted line shows where the slit forming the tongue is made.



FIG. 3.—Prepared Stock and Scion with tongue opened.



FIG. 4.—W.T. Graft brought together and ready for the ligature.



FIG. 5.—Proper Scion for Cleft Graft.

"After being grafted, the cuttings should be stratified in sand. When calloused they are planted out with the union well below the surface.

Many methods of grafting and budding are employed for working over established vines of indifferent varieties, but for all practical purposes the old English "cleft" and the "whip tongue" grafts are the only two that need be discussed. In my own experience I have found the cleft to be the most successful when grafting old vines level or under ground. The operation is very simple. For instance, select a vine of any age up to twenty years. Saw off the stem above the level of the ground in midwinter (June or July), and paint the transverse section with a mixture of horse dung and clay or lime and sulphur. In August, or just before the sap is moving, the stock should be again cut back to the level of the surface. Choose a backward or dormant scion, and shave it down to a wedge shape (see Fig. 5) from the base of a node down the internode; cleave the stock with a strong knife or chisel, and insert the scion down one side of the cleft. If the stock is large enough, two scions may be inserted, one on each side, bringing the inner bark or cambium layers of both stock and scion in exact juxtaposition." (See Figs. 5, 6, and 7.)

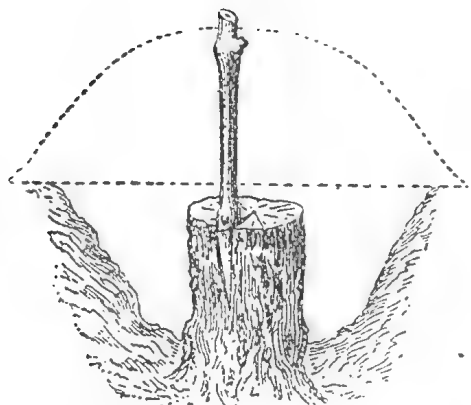


FIG. 6.—Single Cleft Graft.

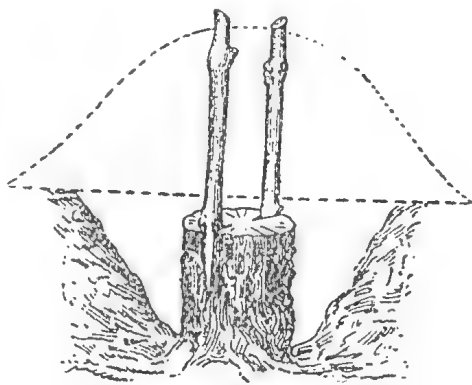


FIG. 7.—Double Cleft Graft.

CULTIVATION.

If the land has been thoroughly prepared in the first place, the subsequent cultivation, once the vines have been planted, is a simple matter, provided it is carried out systematically. Once the vines have been planted, the whole of the ground between the rows, if the vineyard is trellised, or the whole of the ground other than that actually occupied by the vine, if the vines are grown as a bush, must be kept well worked so as to prevent the surface of the soil setting and thus drying out, and also to keep down all weed growth. The first cultivation need not be very deep, but if dry weather sets in the subsequent cultivations must be gradually increased in depth until there is not less than 6 in. of finely worked surface soil. Such a soil mulch will tend to keep the moisture required for the proper development of the vines in the ground for several months, even though there may be no rain in the interval. Cultivation as described is essential in our hotter and drier districts, and provided that there are good winter rains it will insure a sufficient supply of moisture to mature a full crop of fruit. In districts having a better rainfall such deep cultivation is not so necessary; at the same time the land must be cultivated after every rain and the surface kept in a state of proper tilth. Once the crop has been gathered and the wood has thoroughly matured, the cultivations need not be so frequent. At the same time the surface of the soil must be kept from setting, and weed growth must be prevented. After the vines have received their winter pruning the ground should be ploughed deeply, as if the surface roots have been removed as directed there will be no danger of injuring the vines, as all the roots will be out of the way of the plough.

IRRIGATION.

The following remarks apply particularly to vines growing in our dry western country, where suitable water for irrigation is available. If the ground is very dry during the winter it should receive a good soaking after the vines have been pruned, and just before the sap commences to rise in spring. The irrigation should be given by means of furrows between the rows, and enough water should be applied to saturate the whole of the land, as if this is done and the land is cultivated as soon as it can be worked without packing, the moisture can be retained and will probably be sufficient to produce a crop without any further irrigation, or even rain. Winter irrigation when necessary must be thorough, as a partial watering would do little, if any, good. Should

there be a fair winter rainfall followed by a very hot and dry spring, the soil may dry out, or at any rate become so depleted of moisture that the grapes will not swell out properly, and there will be a poor yield in consequence. When there is any danger of this, a good irrigation should be given at the time the grapes are forming their seeds, and this should be followed by systematic cultivation. If this is done no more water will be required. Frequent irrigations are not wanted, and they do more harm than good. Give a good soaking when necessary, and depend on cultivation to keep the moisture in the soil.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MAY, 1922, AND 1921, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	May.	No. of Years' Records.	May, 1922.	May, 1921.		May.	No. of Years' Records.	May, 1922.	May, 1921.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
	In.		In.	In.		In.		In.	In.
Atherton ...	2.24	21	1.29	2.53	Nambour ...	5.10	26	5.33	3.78
Cairns ...	4.75	40	3.91	6.50	Nanango ...	1.67	40	0.16	1.31
Cardwell ...	3.83	50	1.34	6.51	Rockhampton ...	1.63	35	0.15	1.25
Cooktown ...	3.18	46	1.46	2.18	Woodford ...	3.05	35	1.47	2.34
Herberton ...	1.60	35	1.16	2.92					
Ingham ...	3.76	30	1.79	4.20	<i>Darling Downs.</i>				
Innisfail ...	13.08	41	9.65	16.87	Dalby ...	1.38	52	0.20	1.96
Mossman ...	3.51	14	4.25	5.41	Emu Vale ...	1.26	26	0.12	0.98
Townsville ...	1.43	51	0.23	2.05	Jimbour ...	1.27	34	Nil	1.47
					Miles ...	1.61	37	Nil	1.31
<i>Central Coast.</i>					Stanthorpe ...	2.01	49	0.06	3.05
Ayr ...	1.28	35	0.53	1.45	Toowoomba ...	2.35	50	0.18	1.23
Bowen ...	1.40	51	0.07	0.99	Warwick ...	1.66	57	0.03	0.88
Charters Towers ...	0.86	40	0.10	1.30					
Mackay ...	4.00	51	2.03	1.41	<i>Maranoa.</i>				
Proserpine ...	5.45	19	1.66	5.44	Roma ...	1.50	48	0.02	0.59
St. Lawrence ...	1.93	51	0.92	1.61					
<i>South Coast.</i>					<i>State Farms, &c.</i>				
Biggenden ...	1.96	23	0.27	2.73	Bungewongorai ...	0.75	8	0.05	0.53
Bandaberg ...	2.82	39	0.51	2.04	Gatton College ...	1.91	23	0.02	1.17
Brisbane ...	2.88	71	2.04	0.76	Gindie ...	1.14	23	Nil	1.44
Childers ...	2.42	27	0.50	2.62	Hermitage ...	1.42	16	Nil	1.06
Crohamhurst ...	5.14	30	3.50	3.91	Kairi ...	2.49	8	1.10	3.50
Esk ...	2.16	35	0.31	0.92	Sugar Experiment Station, Mackay	3.73	25	...	1.76
Gayndah ...	1.63	51	Nil	2.63	Warren ...	1.39	8	...	0.94
Gympie ...	3.07	52	1.69	1.59					
Glasshouse M'tains	3.72	14	4.63	1.87					
Kilkivan ...	2.00	43	0.17	1.18					
Maryborough ...	3.16	51	1.60	1.96					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for May this year, and for the same period of 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE E. BOND,
State Meteorologist.

BUTTER AND CHEESE SHOW.

The year 1921 saw Queensland produce 42,149,352 lb. of butter for export, and 16,016,000 lb. for local consumption, representing a value of £4,845,935.

Cheese factories produced 11,000,000 lb. of that commodity during the same period for export, and 2,000,000 lb. for local consumption, representing a value of £653,956.

Condensed milk production reached the value of £750,000, so that, exclusive of by-products, the dairy industry was worth £6,249,891 to Queensland in 1921.

It is now approaching in importance the sugar industry, the premier agricultural industry in this State.—Hon. W. N. Gillies.

The Minister for Agriculture (Hon. W. N. Gillies), in the course of his inaugural address at the opening of the butter and cheese show conducted at the Exhibition grounds by the Queensland Butter and Cheese Factory Managers' Association on the 22nd June, expressed the belief that Queensland was destined to become the chief dairy produce State in Australia, and provided the foregoing review of the present value of the industry to this community.

Following is an epitome of other points of an important address:—

The value and benefits to the dairying industry, from an educational point of view, arising from the meetings of managers of butter and cheese factories for the purpose of conferring upon questions associated with the manufacture of dairy foodstuffs and the management of factories generally can hardly be over-estimated.

The Department of Agriculture and Stock is always in readiness to assist in co-operating in any educational work that the dairying companies may institute. Further, it is always prepared to give technical instruction on chemical, bacteriological, and similar questions, so far as the dairying industry is concerned.

In addition to the dairy inspectors and graders connected with the Department, there are half a score of officers who are always eager to impart their knowledge to all those interested in the industry.

Mr. R. Winks, senior State grader, who judged the butter exhibits, had described to him the display as the finest he had ever seen, both as regards quality and uniformity of manufacture, and the judge attributed this all-round excellence of quality to the fact that the bulk of the butter on show had been manufactured under the pasteurisation system.

Referring to the announcement of the Minister for Customs on the previous day respecting the much-debated question of grading for export, the Minister expressed a hope that the agreement between the State and Federal authorities would provide for an equitable and amicable adjustment of differences in connection with the points at issue.

The Agent-General (Hon. J. A. Fihelly) had forwarded a communication in which he quoted the view of Mr. M. S. Foley, of Messrs. Foley Bros., that too much unsalted butter was being shipped from Queensland. Mr. Foley contended that not more than 25 per cent. unsalted butter should be despatched to the London market from this State. The Agent-General had then expressed the view that butter would stabilise at about 180s. and remain about that figure until Russia and Germany recommenced trade relations. War glut stocks had been cleared at from 60s. to 80s. per cwt. Recent prices were:—11th May, 164s. to 166s. per cwt.; 20th May, 162s. to 166s.; 3rd June, 158s. to 162s.; 10th June, 170s. to 176s.; 17th June, 192s. to 196s.; 21st June, 208s. to 210s.

Queensland is destined to become the greatest dairy produce area in Australia. We have the climate, the rainfall, and the land, and by applying science and intelligence to the production, manufacture, and sale of the article, this destiny will be fulfilled, provided of course that the purchasing power of the consumers enables them to obtain dairy produce—and not cheap substitutes—and at a price that will make dairying profitable.

Following are the particulars of the judges' opinions of the butters and cheeses entered in the respective competition classes:—

RESULTS.

BUTTER.

EIGHT WEEKS' STORAGE.

	Flavour.	Texture.	Salt.	Colour.	Finish.	Packing.	Total.
Queensland Farmers' Co-op. Ltd. (Booval) ..	54½	20	5	5	5	5	94½
Queensland Farmers (Grantham) ..	54	20	5	5	5	5	94
Oakey Co-op. Ltd. ..	53½	20	5	5	5	5	93½
Wide Bay Co. ..	53	20	5	5	5	5	93
Warwick Butter and Dairy Co. (Allora) ..	53	20	5	5	5	5	93
Downs Co-op. Ltd. (Dalby) ..	53	20	5	5	5	5	93
Queensland Farmers (Boonah) ..	53	20	5	5	5	5	93
Maryborough Co. (Kingaroy) ..	53	20	5	5	5	5	93
Downs Co-op. Co. (Crow's Nest) ..	52½	20	5	5	5	5	92½
Stanley River Co-op. Co. ..	52½	20	5	5	5	5	92½
Nanango Co. ..	52	20	5	5	5	5	92
Downs Co-op. Co. (Toowoomba) ..	52	20	5	5	5	5	92
Warwick Co. (Millhill) ..	52	20	5	5	5	5	92
Caboolture Co. (Pomona) ..	52	20	5	4½	5	5	91½
Caboolture Co. (Eumundi) ..	52	19½	5	4½	5	5	91
South Burnett Co. (Murgon) ..	51½	20	5	4½	5	5	91
Gayndah Co. ..	51½	20	5	4½	5	5	91
Downs Co. (Clifton) ..	51	20	5	4½	5	5	90½
Queensland Farmers (Laidley) ..	50	20	5	5	5	5	90
Port Curtis Co. ..	51	20	5	5	4	5	90
Wide Bay Co. (Gympie) ..	49	20	5	5	5	5	89

30 DAYS' STORAGE.

South Burnett Co. (Murgon) ..	54½	20	5	5	5	5	94½
Queensland Farmers (Booval) ..	54	20	5	5	5	5	94
Queensland Farmers (Grantham) ..	53½	20	5	5	5	5	93½
Queensland Farmers (Boonah) ..	53½	20	5	5	5	5	93½
Warwick Co. (Allora) ..	53½	20	5	5	5	5	93½
Downs Co. (Toowoomba) ..	53½	20	5	5	5	5	93½
Wide Bay Co. (Gympie) ..	53½	20	5	5	5	5	93½
Maryborough Co. (Kingaroy) ..	53	20	5	5	5	5	93
Nanango Co. ..	53	20	5	5	5	5	93
Downs Co. (Crow's Nest) ..	53	20	5	5	5	5	93
Downs Co. (Dalby) ..	53	20	5	5	5	5	93
Stanley River Co. ..	53	20	5	5	5	5	93
Oakey Co. ..	53	20	5	5	5	5	93
Caboolture Co. (Eumundi) ..	52½	20	5	5	5	5	92½
Caboolture Co. (Pomona) ..	53	20	5	4½	5	5	92½
Wide Bay Co. (Cooroy) ..	52	20	5	5	5	5	92
Queensland Farmers (Laidley) ..	52	20	5	5	5	5	92
Warwick Co. (Millhill) ..	52	20	5	5	5	5	92
Downs Co. (Clifton) ..	51	20	5	5	5	5	91
Downs Co. (Miles) ..	51	20	5	5	5	5	91
Gayndah Co. ..	51	20	5	5	5	5	91
Port Curtis Co. ..	51	20	5	5	5	5	91

FRESH.

Queensland Farmers (Laidley) ..	55	20	5	5	5	5	95
Queensland Farmers (Grantham) ..	54½	20	5	5	5	5	94½
Queensland Farmers (Booval) ..	54	20	5	5	5	5	94
Caboolture Co. (Eumundi) ..	54½	20	5	4½	5	5	94
Queensland Farmers (Boonah) ..	54	20	5	5	5	5	94
South Burnett ..	54½	20	5	4½	5	5	94
Warwick Co. (Allora) ..	54	19	5	5	5	5	93
Wide Bay Co. (Gympie) ..	54	19	5	5	5	5	93
Downs Co. (Dalby) ..	54	19½	5	4½	5	5	93
Gayndah Co. ..	53	20	5	4½	5	5	92½
Stanley River Co. ..	53	20	5	4½	5	5	92½
Downs Co. (Crow's Nest) ..	53	20	5	4½	5	5	92½
Maryborough Co. (Kingaroy) ..	53½	19½	5	4½	5	5	92½
Downs Co. (Clifton) ..	52½	19½	5	5	5	5	92½
Wide Bay (Cooroy) ..	52½	19	5	5	5	5	92½
Caboolture Co. (Pomona) ..	52½	19	5	4½	5	5	91½

CHEESE.

TWO EXPORT.

	Flavour.	Texture.	Colour.	Finish.	Total.
Pittsworth Co. (P. Factory) ..	47	25	14½	9	95½
Pittsworth Co. ..	45	25	15	9½	94½
Pittsworth Co. (E. Factory) ..	44	24½	15	9½	93
Downs Co. (Gowrie Junction) ..	43	24½	14½	9½	91½
Woodleigh Cheese Factory ..	43	25	14	9	91
Downs Co. (Jondaryan) ..	42	25	14½	9½	91
Downs Co. (Koonaldal) ..	43	24½	14	9½	91
MacLagan Valley Co. (No. 1 Factory) ..	43	24	14	9	90
Biddeston Co. ..	42	24½	14½	9	90
Downs Co. (Hodgson Vale) ..	42	24½	14½	9	90
Warwick Co. (Bony Mountain) ..	42	24½	14½	8	89
Warwick Co. (Greymare) ..	42	24½	14	8½	89
Downs Co. (Gowrie Junction) ..	40	24½	14½	9	88

CHEESE—continued.

TWO MEDIUM CHEESES—UNDER ONE MONTH.

	Flavour.	Texture.	Colour.	Finish.	Total
Pittsworth Co.	46	25	15	9½	95½
Merrimac Cheese Factory	45½	25	15	9½	95
Pittsworth Co. (P. Factory)	45	25	14½	9	93½
Biddeston Co.	44	25	15	9	93
Pittsworth Co. (E. Factory)	44	25	15	9	93
MacLagan Valley (No. 2 Factory)	43½	25	14½	9½	92½
Downs Co. (Hodgson Vale)	43	25	15	9½	92
Downs Co. (Westbrook)	42	25	14½	10	91½
Warwick Co. (Elbow Valley)	42	25	15	9	91
Warwick Co. (Lord John Swamp)	42½	25	14½	8½	90½
Downs Co. (Koondai)	41½	24½	14½	9½	90
Downs Co. (Gowrie Junction)	42	24½	14½	9	90
Warwick Co. (Greymare)	40	24	14½	9	88
Woodleigh Factory	39	25	15	9	88
Downs Co. (Jondaryan)	41	24½	13½	9½	87½
Warwick Co. (Bony Mountain)	39	24½	14	9	87

TWO MEDIUM CHEESES—OVER TWO MONTHS.

Downs Co. (Jondaryan)	43½	25	15	10	93½
Pittsworth Co.	44	24½	15	9	92
Pittsworth Co. (E. Factory)	43½	24½	14½	9	91½
Biddeston Co.	42	25	15	9	91
Woodleigh Factory	43	24½	14½	9	91
Warwick Co. (Elbow Valley)	43½	24	14½	9	91
Downs Co. (Koondai)	42½	24½	14½	9	90½
Merrimac Co.	41½	24½	15	9½	90½
Downs Co. (Westbrook)	41	24½	14½	10	90
Pittsworth Co. (P. Factory)	42	24½	14	9	90
Warwick Co. (Lord John Swamp)	41½	24½	14	9½	90
Warwick Co. (Bony Mountain)	41½	24½	14	9	89
Downs Co. (Gowrie Junction)	39	25	15	9½	88½
MacLagan Valley (No. 1 Factory)	40	24	14	9½	87½
Warwick Co. (Greymare)	39	24	14	8½	85½

TWO LOAF CHEESES—UNDER ONE MONTH.

Merrimac Co.	45	25	15	9½	94½
Pittsworth Co.	45	25	14½	9	93½
MacLagan (No. 2 Factory)	43	25	15	10	93
Warwick Co. (Elbow Vale)	44	25	15	8½	92½
Downs Co. (Jondaryan)	43	25	15	9½	92½
Pittsworth Co. (P. Factory)	44½	25	14½	8½	92½
Downs Co. (Westbrook)	42	25	14½	10	91½
Woodleigh Factory	43	25	15	8½	91½
Downs Co. (Gowrie Junction)	42½	25	15	9	91½
Warwick Co. (Lord John Swamp)	42	25	15	9	91
Pittsworth Co. (E. Factory)	42	25	15	9	91
Biddeston Co.	42½	25	14	9½	91
George W. Stanley (Rodgers' Creek)	42	25	14½	8½	90
Downs Co. (Koondai)	41	25	14	10	90
Warwick Co. (Bony Mountain)	39	25	15	9	88
Downs Co. (Hodgson Vale)	37	24	15	10	86
Warwick Co. (Greymare)	38	24½	14½	8½	85½

TWO LOAF CHEESES—OVER TWO MONTHS.

Pittsworth Co. (P. Factory)	46	25	15	9	95
Pittsworth Co.	46	25	15	8½	94½
Downs Co. (Jondaryan)	42½	25	15	9½	92
Biddeston Co.	42	25	15	9½	91½
Warwick Co. (Elbow Vale)	43	24½	14½	9	91
George W. Stanley	42½	24½	15	8½	90½
Downs Co. (Koondai)	41½	25	14	9½	90
Warwick Co. (Greymare)	41	25	15	9	90
Warwick Co. (Bony Mountain)	41½	25	14½	9	90
Merrimac Factory	41½	24½	15	9½	90
Pittsworth (E. Factory)	41½	24½	14½	9	89½
Downs Co. (Westbrook)	40	24	15	10	89
Downs Co. (Hodgson's Vale)	40	25	14½	9½	89
Woodleigh Factory	40	24½	14½	9½	88½
Downs Co. (Gowrie Junction)	38½	25	14½	10	88
MacLagan (No. 1 Factory)	40	24	14	9	87
Warwick Co. (Lord John Swamp)	38	24½	14½	8½	85½

THE QUALITY OF EXPORT BUTTER.

Paper read at the Annual Conference of the Queensland Butter and Cheese Factory Managers' Association at Brisbane on the 22nd and 23rd June, 1922, by Mr. R. W. Winks (Senior Grader, Department of Agriculture and Stock).

Going back about thirty years, some of us can call to mind the condition of dairying as it was then carried on in Queensland. The system—if it could be called one—was on a par with that practised by the Turcomans and other more or less nomadic hordes inhabiting the steppes of Western Asia and South-eastern Europe from time immemorial—primitive in the extreme. Cows were milked but once daily. The calves, getting all the richest of the milk, were allowed to run with their mothers during the day time. The cream was collected by gravitation, churned in any old thing from an old-fashioned plunging churn to a milk pail, and the butter worked and washed by hand just as one would knead a batch of dough. Is it to be wondered at that butter thus made (even though in its early stages it was often extremely palatable), owing to want of sufficiently cold wash water and to contact with the hands of the operator, would not keep sweet for more than a few hours? The whole process tended towards working the butter-milk in instead of working it out. Nobody dreamed of an export trade in those days. Queues of us used to line up at the various stores, and we were glad to accept as low as fourpence per lb. for our small parcels of butter. Then a change came.

A few enterprising men, among whom the late Mr. John Reid was the most prominent, and to whom the dairying industry is deeply indebted, made a beginning of what was known as the Proprietary Factory System. Almost simultaneously the then Queensland Government inaugurated the travelling dairy to go from place to place, giving instruction and practical demonstration to all who cared to attend the operations either as students or spectators. The travelling dairy was established ostensibly to teach farmers how to manufacture a uniformly marketable article, but in reality the object was to train dairy folk in handling the raw product at the farm, and thereby pave the way for the co-operative factory system. How it succeeded, the large number of well-equipped factories—both butter and cheese—afford ample evidence.

The separator and steam-driven machinery revolutionised the industry. I shall not weary you much further by recapitulating what nearly everybody now knows, but as the improvement or otherwise of our butter is the main subject of this paper I should like to say this:—One often hears the remark that butter was just as good twenty years ago as it is to-day. Now there is a certain amount of truth in this, but the high-class butter at an earlier period of the industry represented only a small proportion of the total output as compared with the position at the present time, and it is this discrepancy we are trying to reduce as nearly as possible to vanishing point.

For years past we have been gradually increasing the percentage of our first-grade butter, and now that pasteurisation has been adopted by the majority of our manufacturers, the amount of first-grade butter should get a still further uplift. In other countries, pasteurisation has long since got beyond the experimental stage, and experiments conducted by the Department of Agriculture here have only confirmed what in other parts of the world were accepted as established facts. It is in the improvement of the keeping qualities of butter that pasteurisation excels the older method. It also gives a better body, and a texture more free from sponginess and mottle, thus making it carry better. A notable feature of last season's output was the comparatively small amount of "fishy" butter. As to whether or not pasteurisation is responsible for this, it might be premature to offer an opinion.

NINETY-POINT BUTTER.

This much, however, can be said:—That of two lots of butter from the same factory, upon being regraded after being held in cold store for some time, one, the non-pasteurised, was decidedly "fishy," while the other was free from taint. Who can say but that pasteurisation may be the means of minimising, if not completely eliminating, this most objectionable of all taints affecting butter?

A positive menace to the export butter trade to which I would draw attention is the unduly large quantity of so-called 90-point butter—i.e., a butter given full points for body, texture, condition, &c., and only 40 points for flavour. Butter of this description is always deficient in aroma, and rarely "noses" well, and yet to the taste there may be nothing really objectionable. The grader always has misgivings when stamping it first-class, for he feels certain it will not keep. Such butter may be serviceable for immediate use, but it will deteriorate even while in cold store, and after being released thence rapidly goes to pieces. The elimination of a few cans

of doubtful cream might easily make a 90-point butter score 92 points. In the past, when the same price was paid for a first-class butter, irrespective of what it may have scored, there was some excuse for manufacturers to turn out a butter of this class. Their argument was, in effect, that it was more profitable to the factory to get 100 boxes going 90 points than 75 boxes scoring 92 points, when the price per lb. was the same in either case. The present arrangement, to pay according to points value, has improved the situation, yet there is still too great a proportion of this minimum first-grade butter.

With two equally good judges, one might award a butter of this class 90 points while the other might give it 89. If the butter was intended for export, the probabilities are that the latter would be right. For where is the sense in stamping at this end as first-class a butter that it is odds on will turn out other than first-grade when opened up in London.

SHORT WEIGHTS.

The Regulations in connection with short weights were framed chiefly for the prevention of the practice of packing dairy produce at a weight less than that stated in the trade description—a custom somewhat prevalent in the past. In all the cases coming under my notice, however, during the past three or four years, I do not believe that there was one of actual dishonesty. Carelessness there may have been. Frequently boxes of butter containing 58½ lb. and 59 lb. have been met with, while one actually tipped the beam at 60 lb. net. It has often happened that after a manufacturer had been penalised for putting up short-weight butter, he got the "wind up" and rushed to the opposite extreme. In a recent case a defaulting factory, to be on the safe side, submitted for examination two consignments amounting to 462 boxes, ten of which, taken at random from the grading floor, sealed on an average 57½ lb. net. The amount of butter (over ten boxes) given away in this one instance would have gone a long way towards purchasing a thoroughly accurate weighing-machine. This is by no means an isolated case. The main points in avoiding incorrect weights are a good scales and a reliable man to do the weighing; put 56½ lb. of butter into each box, ramming the corners well. Stamp every box "bare weight." Then there is a quarter of a pound of butter to come and go on, should there be any shrinkage owing to the escape of free moisture. Then, provided the net weight does not fall below that given in the trade description, the factory is safe.

FAULTY PACKING.

Notice of defects in packing is often omitted from the grading memos., owing to the fact that they are frequently filled in before the butter is stripped. Besides, it is impossible for the graders to superintend the weighing of every box. The principal defect is in the butter not being packed into the corners of the box, making the cube irregular in shape and increasing the risk of contamination.

CONCLUSION.

As already mentioned, taken as a whole, the percentage of first-grade butter last season has perceptibly increased—a fact in which pasteurisation, beyond doubt, was a big factor.

Given favourable seasons, there is no question about the increased output. The first obstacles have been cleared, and though some yet have to be negotiated, things are moving in the right direction. I recollect when the manager of the travelling dairy advocated milking twice daily, nine out of ten of the young men addressed (and they were not schemers either) retorted "Milk twice a day! No, not for Father Peter!" with an emphasis that bespoke sincerity. Many of these young fellows are among the staunchest of factory suppliers to-day. Who knows but that in the not distant future rugging of cows when exposed to extreme weather conditions, when half the food they eat goes to keep up the heat of their bodies at the expense of the milk yield, provision for winter feed, thereby regulating the winter and summer supply of our dairy produce so that the bulk of it does not arrive in overseas markets at one particular period of the year, and other innovations described by the unthinking as the ravings of theorists, may be the rule instead of the exception, as at present? Quite recently I received a letter from a man in London who is in touch with the butter trade there, in which he informed me that millions sterling was being invested in Holland alone in improving their butter, which means another formidable competitor in the London market. Quality, therefore, every time and all the time, should be the slogan of our dairymen.

The opening up for closer settlement of the Upper Burnett, where there is a large area of ideal dairying country, will add enormously to the total output of our factories; and, unquestionably, will help to place Queensland ahead of any other State in the Commonwealth in the production of butter and cheese—a position to which her natural advantages entitle her.

THE SUMMER FALLOW.

As the underlying principles governing the preparation and cleanliness of land for cropping in Canada are applicable to other countries, the subjoined reprint from the March issue of "Seasonable Hints," issued by the Dominion Experimental Farms Authorities, Ottawa, has been made for the readers of this Journal:—

Under average western conditions, the summer-fallow must be regarded as a necessary evil. Years of experience have proved that a good summer-fallow is the foundation for good crops. The advantages of the fallow are that it cleans the land of grasses and weeds, stores and conserves moisture, renders plant food readily available, and leaves the land in excellent condition for early spring seeding. The disadvantages are that it is expensive, requiring much labour and the loss of a year's crop; it is wasteful of fertility, as often too much plant food is rendered available; it rapidly reduces the humus and vegetable fibre in the soil with resultant soil drifting.

For seven years an experiment has been conducted at the Lacombe Experimental Station in which, annually, seventeen different methods of summer-fallow treatment have been applied in order to obtain data as to the best methods of ploughing and cultivating the fallow. Some of the methods tried have been previous fall cultivation, shallow fall ploughing, different times and depths of ploughing, once and twice ploughing, different methods of cultivation after ploughing, and growing a forage crop on the fallow. The effects on the condition of the soil and the crop yields for two seasons following have been recorded. The deductions from these 119 tests are summarised in the following paragraphs:—

The two main objects of the summer-fallow are to kill weeds and store moisture, and, fortunately, both objects are attained by the same methods. Cultivation of the land to be fallowed should start at cutting time the previous year. If the binder is followed by the disc, moisture will be stored and many weed seeds will germinate and be killed by frost. If possible, this disced land should be harrowed early in the following spring. This will prevent evaporation and start a second crop of weed seeds growing. When the land is very dirty it should again be cultivated or disced immediately after spring seeding, as this will kill the growing weeds and start a new growth. All of this means work, but much of the labour will be saved when the fallow is ploughed, as it will be found that the soil contains much more moisture than a fallow not cultivated, and that the land ploughs very much more easily. *One standard rule should be to get the fallow ploughed early, and by the end of June at the latest.* The average results of the seven-year tests show an increased yield of wheat of 5 bushels 31 lb. from land ploughed on 15th May over land ploughed on 15th July. May ploughing is seldom practicable, but the fallow should be ploughed as early as possible after seeding. If the land is badly infested with weeds, particularly couch grass, it may be necessary to plough the land twice, but twice ploughing invariably reduces the yield of wheat. If the land must be ploughed twice, the first ploughing should be early and shallow, about 4 in. deep, with the second ploughing done as early in the summer as possible, and about 2 in. deeper than the first ploughing. The largest yields have been produced from land ploughed once and 5 or 6 in. deep. In heavy clay soils, deep ploughing may at times be necessary to break up a hard pan left by the plough. In some districts the custom is to manure the land previous to summer fallowing, but this is seldom good practice. Fallowed land usually has a surplus of available fertility, and better returns from the manure will be secured if it is applied on the first-year stubble and immediately ploughed in. After the land has been ploughed it should at once be packed or cultivated to break it down and prevent evaporation. When a good seed bed has been secured the land should be given cultivation only as required to kill grass or weeds. Too frequent cultivation, particularly with the disc, will cause drifting. The disc is good for breaking down sods and lumps, and acts as a packer; but for killing weeds and preventing drifting the duckfoot cultivator is very much more satisfactory.

The rule in many parts of the West, particularly in the drier areas, has been to summer-fallow every third year, but it is yearly becoming more evident that methods must be adopted to avoid such frequent fallowing. Soil drifting, caused mainly by too frequent fallowing and the resultant depletion of vegetable fibre in the soil, is now in many parts as great a problem as moisture supply. Many experiments with summer-fallow substitutes are now underway, but for the drier areas the adoption of longer rotations in which more grass crops are grown seems a much surer method. Cultivation after the binder will do much to help the moisture supply, but nothing has yet been discovered to equal the bare fallow as a method of killing weeds and storing moisture. The bare fallow is so expensive that nothing should be allowed to prevent the work being properly done. A good fallow ensures two good crops, but to plough a fallow after the weeds have pumped all the moisture out of the soil and dropped a heavy crop of seeds is to ensure crop failure for two or three years.

[NOTE.—The seasons in Canada are the reverse of our Queensland seasons, and allowances must be made for climatic differences.—Ed.]

STOCK BREEDING.

The May issue of the "Journal of the Victorian Department of Agriculture" contains a very interesting and instructive paper, which is well worthy of the attention of dairy farmers in Queensland, entitled "Hints to Beginners," by J. S. McFadzean, Senior Dairy Supervisor. The paper, which was read at the Annual Convention of the Chamber of Agriculture, held at Horsham, 6th April, 1922, reads as follows:—

VALUE OF PURE BREEDING.

To increase the productiveness of the farm should be the principal aim of every man on the land. Nearly every farmer is a raiser of stock of some variety; and stock and stock products constitute a very large proportion of agricultural production. Higher-priced land, higher rates of interest, higher cost of living, and higher-priced labour make it most essential that everything possible must be done to increase the acre production, in order to show a profit on the work of the farm. Well-bred stock cost no more to feed and care for than inferior animals, but they bring in much more money. Well-bred sheep cut more wool and make better mutton than those of mixed breeding. A herd of pure-bred cattle will bring in better returns than cross-breeds, whether for beef or dairy produce. In fact, for every utility a more even quality and more remunerative class of stock is obtainable by pure breeding than by crossing. If none but pure-bred sires were used in every line of stock-breeding, the acre production of every farm would be greatly increased; therefore, all matings made should be on the line of preserving purity of blood rather than cross-breeding.

BREED SPOILING.

Every farmer has not the ambition to become a breeder of stud stock. Very few indeed have that natural aptitude for the work which is essential to success; but this is no reason why those who are not stud breeders should persistently spoil the work of those who are. Australia possesses some of the most able stock-breeders in the world, who have done much to improve the breeds they are working with; but they are unfortunately surrounded by thousands of other stock-raisers who, by crossing and mixing up of both strains and breeds, are keeping the general quality of farm animals down to a very low level.

AN UNWARRANTED PREJUDICE.

Carelessness, want of thought, and want of knowledge all contribute to this unfortunate condition in agriculture; but an unaccountable prejudice against close breeding is responsible for the great amount of cross-breeding that is done. That such prejudice is able to exist is due to the fact that many people will accept the questionable statements of others rather than the definite evidence by which they are surrounded. The plain fact is, that all good quality which is present in domestic stock has been fixed there by close breeding, and all deterioration has resulted from indiscriminate crossing. There has, however, of late years, been a gradual change in regard to this subject in the minds of stock raisers. The advantages of higher grade animals are becoming more widely recognised each year, and more pure sires are being used. The younger generation of farmers includes a larger percentage of breeders of pure stock than were to be found thirty years ago; but the prejudice against close breeding is still sufficiently strong and widespread to seriously interfere with progress; and, until that is changed, advancement in stock raising will not be general.

BLOOD RELATIONSHIP ESSENTIAL.

The hackneyed phrase, "Like produces like," is used by almost every one who endeavours to explain the laws of breeding; and is intended to convey the idea that the parent stock must have characteristics in common, if similar features are to be reproduced in the progeny. But most of those who use the term overlook the fact that a likeness such as is essential to this reproduction does not often exist between a male and female unless they are related in some way. A true likeness usually indicates blood relationship. In very rare instances would the direct offspring be found to reproduce features which the parents had in common, unless blood relationship existed between them.

CLOSE BREEDING IN NATURE.

Those who declaim against close breeding base their whole opposition to it on the grounds that it leads to constitutional weakness; yet all round us in nature close breeding is the rule, and has been the rule for all time. Every variety and sub-variety of animal, bird, reptile, or insect breeds close, otherwise they would not

exist in varieties as we find them. Cross-breeding is not followed in nature; and no line of study on any species of stock can be carried on without accepting the fact that it owes its existence solely to close mating.

AN HISTORICAL EXAMPLE.

The earliest records of stock-breeding furnish evidence that this was recognised when our present breeds of domestic cattle were being perfected. The history of the British Shorthorn shows that the perfection of that breed in the year 1810 was the bull 'Comet.' This bull resulted from the successive matings of, first the bull 'Bolingbroke' with the cow 'Phœnix,' which were both sired by 'Foljambe'; then their son 'Favourite' was mated back to his dam 'Phœnix,' and the heifer 'Young Phœnix' resulted; and 'Comet' was a calf from 'Young Phœnix' by her own sire 'Favourite.' This bull was sold for 1,000 guineas, and is one of the foundation stock of the present-day Shorthorn. That this was not haphazard mating is seen from the mention that the Collings Brothers, who bred 'Comet' and many other high class Shorthorns, learned their business from the older breeder, Robert Bakewell, whose name is honoured as one of the founders of both Shorthorn cattle and British long-wool sheep. But it should not require any modern evidence to convince one who gives this subject serious thought, that it would be impossible for any breed of animal to have been perfected without close breeding; and it follows that what will make a breed, cannot be considered as tending to destroy it. Further, we come at once back to the fact that all cross-breeding which has been carried out by thousands of stock raisers since the time of Collings Brothers, has produced nothing but inferior stock.

Scrutiny of the pedigree of the present-day thorough-bred horse also brings overwhelming evidence of the success of close breeding; for in speed and stamina these stock give no suggestion of deterioration. Pedigrees of pure-bred sheep and dairy cattle also show that perfection in the flocks and herds of to-day has been maintained by close breeding—the whole of the evidence on this subject being strong in support of preserving a close blood relationship, and against cross-breeding.

GRADING UP.

This brings us back to where mention was made of the widespread loss which has resulted from cross-breeding. Bulls of unknown breeding—the outcome of repeated indiscriminate crosses of various breeds—are being used by many people who raise stock; and the progeny are invariably a grade worse than the parents. Where pure-bred sires are used the progeny shows improvement. Where pure-bred sires of one strain only are used successively, the improvement is still more marked. Still further progress is made where there is rigid selection of the females for each year's matings; and when such selection is followed by the breeding of an improved sire back to his own progeny, the offspring more quickly shows the desired quality.

CONSTITUTIONAL FITNESS.

The one thing which has to be borne in mind is that close breeding is not a system in itself. In nature close breeding is always accompanied by natural selection of the parent stock on the basis of stamina. Such selection is made as the result of fighting amongst the males at the mating season; and through all weakly animals succumbing to the stress of seasons, or the attacks of other animals or reptiles which are natural enemies of their species. Nature allows for selection by strength of constitution; and selection must be fully as rigid in all stock-breeding work by man. A weakling or faulty animal must not be used, or the weakness or fault will be intensified in the progeny by close breeding, just as strength and soundness is similarly reproduced. Close breeding, to be fully satisfactory, must always be accompanied by judicious selection on soundness of constitution.

APTITUDE FOR THE WORK.

No study of systems of breeding will, however, make into successful stud breeders, those who have not the natural aptitude for the work. Unless the farmer is fortunate enough to be born with the faculty of discriminating closely in regard to excellence in high-class animals, he will be well advised not to attempt special stud breeding; but to content himself by working under the advice of some one whose ability as a breeder has been proved, and who will direct as to both culling and mating. Many people who are not capable of doing this work themselves, are most diffident in acknowledging it, and they lose money in consequence. Natural aptitude combined with early training and experience qualifies for this work of stock selection, just as experts are made in any other profession; and those less fortunate should not hesitate to purchase their advice exactly as they would on a subject of law or medicine. The successful stock-breeder is the one most competent to be the adviser of others; and the latter would profit most by the arrangement.

STANDARD TYPE THE BASIS.

In all matings the basis of selection should be on standard show type. Every breed which has any claim to popularity, has been developed for utility purposes, and, in the breeding of these, symmetry and beauty of outline as well as soundness of constitution have been attained. The result, as shown in the high-class animals of each breed, is thus the work of several generations of breeders, each following up and improving where possible, on the work of those preceding; and all stock raisers should aim at maintaining those lines of excellence. In the perfection of symmetry of outline there has been no loss of utility quality; but rather there has been definite gain almost everywhere. More even production (and on a higher grade) is now obtainable from pure-bred stock than at any former period, and no better reason is required for the maintenance of standard type.

EXCLUSIVE STRAIN.

One thing, however, must be borne in mind by all those who raise stock, and this is that many strains of breeds are almost as distinct from others as though they were separate breeds; and, therefore, the crossing of these may give very unsatisfactory results. Where a strain of any breed has been established over a number of years a blood relationship will exist amongst the stock which may not blend well with that of another strain which has kept equally distant throughout its several generations. For this reason it is advisable that the purchase of sires be made on one line of breeding; so that, by continuing the line established by the stud breeder, the farmer or grazier may participate in whatever good results the breeder obtains.

HOW BEST TO WORK.

In conclusion, pure blood lines make for perfection in stock. The repeated mating of pure sires to cross-bred or grade stock will most quickly improve the quality of these latter when the sires used in succession are related. The mating of a selected sire to selected females of his own progeny is more certain to be beneficial than otherwise. The mixing of breeds is a destructive policy; while the crossing of strains should only be attempted under the guidance of expert advice. Increased acre production from stock raising is certain to result from the consistent use of a line of pure-bred sires, and success will be most marked when following closely in the direction advocated.

CANE PEST COMBAT AND CONTROL.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report from Mr. Edmund Jarvis, Entomologist, who is stationed at Meringa, near Cairns:—

"CONDITION OF CANE CROPS.

"About the middle of last month (15th to 26th April) a nice fall of rain (6.13 in.) relieved a situation which, to many cane-farmers, was becoming increasingly serious. In my report for November last it was mentioned that beetles had appeared here in alarming numbers during the 1920-21 season, but that, fortunately, prolonged wet conditions had enabled the cane to attain to a good length before grubs became large enough to do much damage. Although present in considerable force, showers and cloudy days during the critical period kept the tops green, and sticks that had fallen were able to root afresh and so keep alive until crushing time.

"As foretold in the abovementioned report, beetles were very much in evidence again this year (1921-2), and being unchecked by any collecting, have succeeded in spreading farther afield and injuring cane in various localities which up to the present have been comparatively free from the pest.

"On some of the blocks at Greenhills the cane was completely destroyed, in spite of a favourable wet season, at a time when grubs were still in their second instar (half grown); showing the severity of the present infestation. Had dry conditions continued during the past six weeks, many growers would have lost heavily; but it is to be hoped that the recent rainfall, and an additional precipitation of 1.23 in. (30th April to 4th May) may tide us over the worst period of grub activity.

"COLLECTING AT GREENHILLS IN THE PAST.

"Desiring to learn something of the methods of cultivation and grub control practised at Greenhills in the early days of cane-growing, we have got into touch with a previous owner, who tells me that while at Greenhills he planted about 1 ft. deep,

and, on the whole, obtained fair crops. It seems that he tried 'moth-balls' when planting, but without success; so that his field experiments with this form of naphthalene gave similar results to those obtained recently at our laboratory (see March Report, 1922). Beetles were systematically collected and destroyed by him, this being apparently the only artificial control method that yielded beneficial results. He is of opinion that when early thunderstorms are followed by one week of continuous rain, there will be plenty of grubs the following year, but that if one or two days of wet be succeeded by dry weather lasting from four to six weeks, there will be fewer grubs.

"This information regarding the influence of climatic conditions as a controlling factor during the period of oviposition may prove to be of decided economic value, as it is only by such observations, extending over many years, that we can hope to acquire definite knowledge respecting various phases of natural control, and so be in a position at the end of the flying season to form an approximate estimate of the probable strength of the enemy.

"CANE H.146 AT RIVERSTONE.

"A sample of this variety, which is credited with being practically immune from attack by the weevil-borer (*Rhabdoenemis obscura* Boisd.), was obtained last year from South Johnstone Experiment Station, and a row about 3 chains long, planted on 24th September at Riverstone, near Gordonvale, on land where the borer had proved troublesome the previous season. The sets had lost a good many buds during transit, so unfortunately there were many misses.

"When examined on 25th instant (eight months later) the result of this experiment was seen to be very encouraging, the canes in stools of H.146 being much longer, stouter, and of more vigorous appearance than those in adjoining rows of D.1135.

"Apparently this new cane is going to suit the district, and although resembling the latter variety in general habit of growth, possesses the following additional advantages:—The c.c.s. is 15.54, or 1.04 higher than D.1135, and the canes are stouter and longer. This promising variety, which was introduced into Queensland from Hawaii by the Bureau of Sugar Experiment Stations a few years ago, is a medium stout, olive-green cane, with slight black wax, eyes large and flat, internodes to 5 in., zig-zag appearance, habit erect, foliage thin and sparse, resembles D.1135 in growth, good striker and ratooner, rapid grower, practically self-trasher. Age, 11 months; fibre, 11.5; density of juice (Brix. 21.2). (D.1135 = age, 11 months; Brix., 19.03; fibre, 11.00). Its grub-resisting qualities have not been determined, but in all probability it should be equally if not more resistant than D.1135.

"EXPERIMENT PLOTS AT MERINGA.

"The plots at 'Carrah,' which had been treated between the dates 12th November to 8th December were inspected early this month (May).

"The various insecticidal substances applied to the surface of the soil, with a view to inducing beetles to avoid ovipositing in the treated areas, were naphthalene, chloride of lime, coal-tar, tobacco dust, and carbolineum emulsion, the size of each plot being one-eighth of an acre. The method of application, and the enduring qualities of the odours arising from these deterrents, were mentioned in the report for December, 1921.

"At the present time (6th May) the cane both on treated and check plots looks about the same in height and general appearance; and grubs, although present, have not yet done sufficient damage to enable one to form an opinion as to the results of the experiments. In about a month's time, however, after grubs have ceased feeding, it may be possible to arrive at a definite conclusion.

"TRAP-TREES FOR CANE BEETLES.

"In 1896 the 'Australian Sugar Journal' made mention of a certain tree growing at Mackay that for two years in succession had been crowded with cane-beetles, which, after feeding on the foliage, fell to the ground in a sort of paralysed condition and then died. Being anxious to test the killing properties of this tree (a variety of *Per-simmon*) inquiries were made last October, with the result that the owner (Mr. James Croker) very kindly forwarded a number of suckers, taken from the identical tree mentioned, to this Experiment Station; and later on (4th May) was interested enough in our work to follow up this with three fruits from the same tree, so that seeds have now been obtained and planted here. Two of the suckers are growing, but have not, so far, made much headway. Probably the seedlings, which will not receive any check, may make a more rapid growth. In any case, by the time the next lot of beetles emerge there should be enough leaves on the suckers to enable us to test the value of this plant as a possible trap-tree in our district.

"TACHINID-FLY PARASITES.

"Breeding operations are now under way at the Laboratory, and the first lot of flies, from which we intend getting up our stock for liberation by rearing successive broods, have been obtained from the Riverstone district, where twenty-five specimens were let go last December among bored cane belonging to Mr. G. Alley. This cane, by the way, which was considered to be too badly infested to be worth cutting, has now been cleaned up by the parasites, the result being a fine healthy-looking crop of badila which harbours very few cane-borers. Pupæ of the tachinids were obtained from cane sticks in the field twenty-four days after liberation, and flies belonging to the first brood emerged from these pupæ on 22nd January (exactly five weeks after the first introduction).

"Judging by the above results, December appears to be a good month in which to liberate tachinid parasites, as at this time of the year flies from the first brood, emerging early the following month, have time to enter upon the second brood before the wet season commences, and the *Empusa* fungus parasite of this fly makes its appearance.

"The flies resulting from this second brood about the middle of February, having by that time run into four figures, should then have a good chance of becoming permanently established.

"Growers who visit the Meringa Laboratory during the next few months would be able to see these parasites breeding in confinement, and also the life-cycle stages of our digger-wasps, from the egg, which is laid on the body of the paralysed cane-grub, to the maggot, cocoon, and finally the imago or perfect insect."

A MANGOSTEEN FROM NORTH QUEENSLAND.

By C. T. WHITE, Government Botanist.

When in North Queensland recently in search for seeds of two native trees (*Garcinia Mestoni* and *Citrus inodora*), I was informed that a tree of the former was growing in an old garden at Edge Hill, near Cairns. Fruiting specimens of this tree have since been sent me by Mr. W. J. Ross, Instructor in Fruit Culture at Cairns, and they prove to be not the native mangosteen, but an Indian species (*Garcinia Xanthochymus*) cultivated sometimes in North Queensland.

The tree has been confused in North Queensland with the ordinary true mangosteen (*Garcinia Mangostana*); supposed to be one of the most delicious of tropical fruits; but the only tree we actually know of that species is one at the old Kamerunga State Nursery. The present plant was figured and described from Port Douglas as the true mangosteen in the pages of the "Queensland Agricultural Journal" for December, 1910; and another specimen at the same time from the Burdekin Delta was described as *Garcinia cornua*. So it is seen that the tree has been confused a good deal in the past.

Garcinia Xanthochymus (synonym *Xanthochymus pictorius*) is a native of India. The large ripe yellow fruits form an inferior sort of mangosteen. Roxburgh, a well-known writer on Indian plants, states that the green but well-grown fruits yield a bright-yellow juice, which when dried makes a very good gamboge water-colour, either by itself as a yellow or with others to form a green.

The fruit is easily told from that of the true mangosteen and from that of *Meston's* mangosteen by its pointed (not flat) top.

Mr. E. W. Bick, of the Botanic Gardens, informs me that the tree was grown at the Acclimatisation Society's Garden at Bowen Park some years ago, but could only be grown indoors, for as far south as Brisbane the winters prove too severe for it.

The name *Xanthochymus* comes from the Greek *Xanthos* yellow and *chyma* juice—from the yellow juice exuded by the fruits. The genus *Garcinia* is named in honour of a French botanist (Laurent Garcin), who travelled a good deal in the East Indies.

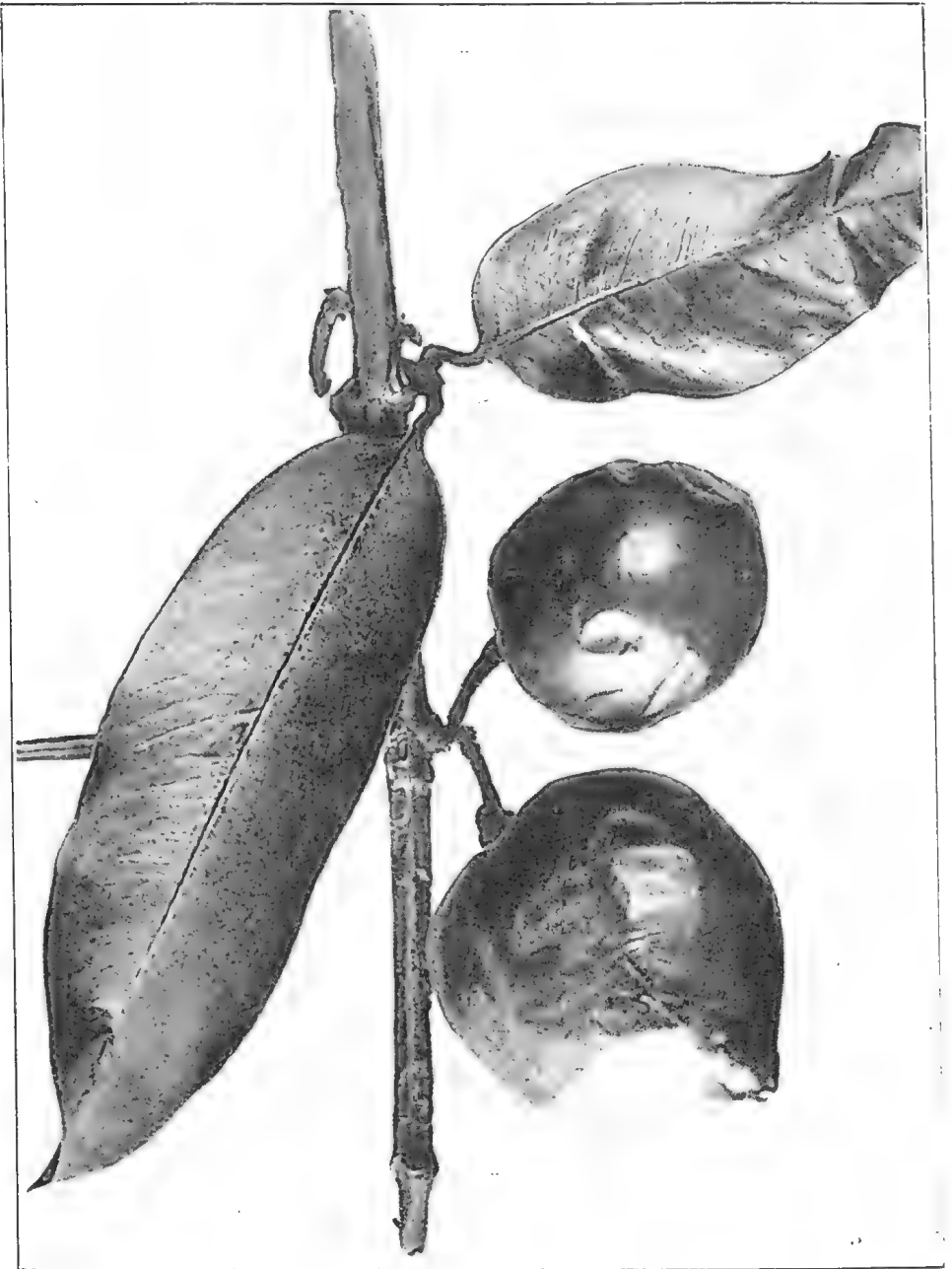


PLATE 1.—MANGOSTEENS ON THE BURDEKIN DELTA, N.Q.

NAMBOUR RURAL SCHOOL—A FLOURISHING INSTITUTION.

Since its establishment, over 800 students from the North Coast districts have received sound technical instruction at the Nambour Rural School. These boys and girls to-day are taking their places on the farms and in the homes, and are proving in a practical manner the value of the instruction imparted at an institution that is an ornament to the educational system of the State and a monument to the faith and foresight of its founders.

The first impressions of a visitor to the Nambour Rural School are of his entrance into a hive of industry; of an assemblage of young Queenslanders of fine physique, keen intelligence, and excellent training; of a staff capable, enthusiastic, and right-down on the job of turning out boys and girls who, in the ordinary course, must naturally be numbered among the State's best citizens.

This school was established as an experiment, and has proved a huge success. In August, 1915, the then Minister for Education, Hon. H. F. Hardacre, announced the intention of his Department to establish a rural school, and Nambour, it was considered, offered special advantages on account of its central position on the North Coast. In addition to ordinary instructional purposes, the school was intended for advanced boys who desired to specialise in agricultural subjects, and for girls who wished for tuition on the domestic side of farm life. The details of the scheme were worked out by the then Under Secretary, Mr. J. D. Story, and early in 1916 a third wing to the existing State school and an economically constructed workshop were provided for the accommodation of the technical students.

In January, 1917, the school was opened, under the charge of Mr. T. G. Fisher, now head master of Townsville West. There followed immediately an influx of boys and girls from the several centres along the North Coast line, extending from Petrie, in the south, to Tandur, in the north. Free railway tickets were issued to all students under the age of 18 years to enable them to attend. Such has been the success of the school that over 800 students from the North Coast districts have received technical instruction since its inception. These boys and girls to-day are taking their places on the farms and in the home, and are proving, in a practical way, the value of scientific and technical training for the farmers of the future. Though technical instruction is the main feature of the curriculum in the senior school, academic phases of primary and secondary education have not been lost to view. This is proved by the excellent results annually obtained by the students in examinations for State scholarships and high schools. In the words of Mr. J. D. Story, at a farewell function to Mr. Fisher in 1919, "The school's academic record is as good as any in Queensland." Agricultural science, milk- and cream-testing, beekeeping, poultry-keeping, wood work, tin work, leather work, and blacksmithing are among the subjects taught in the ordinary daily course, while evening classes in dressmaking, wood work, and commercial subjects have become an important regular feature of the school's technical activities.

For field instruction, visits are regularly made to the demonstration plots at Woombye State school and to surrounding farms and orchards. An officer of the Agricultural Department lectures regularly on fruit culture, and this would appear to be the first step towards co-operation in agricultural education between the two departments, as outlined in the new agricultural policy.

The girls are taught cookery, fruit-preserving, pickling, jam-making, confectionery, dressmaking, millinery, and laundry work. The popularity of these classes may be judged by the fact that dressmaking alone attracts an average of one hundred students each term.

On the athletic side the school is rapidly gaining fame. Teams in football, swimming, cricket, tennis, and basket-ball enter into their games with an enviable enthusiasm, which is inspired and maintained by an able staff of teachers under Mr. R. W. M. Steele, who succeeded Mr. Fisher in 1919.

At a garden fete on 27th May, opened by the Minister for Education, Hon. John Huxham, and at which every district centre was represented, finely finished samples of the students' work were exhibited, and their tradesmanlike excellence called forth much commendatory comment.



Photo: Murray Studios.

PLATE 2.—JUNIOR CLASSES AT PLAY, NAMBOUR RURAL SCHOOL. FRONT VIEW.



Photo: Murray Studios.

PLATE 3.—DISPLAY OF CLUB SWINGING BY NAMBOUR RURAL SCHOOL GIRLS
AT GARDEN FETE, 27th MAY, 1922.

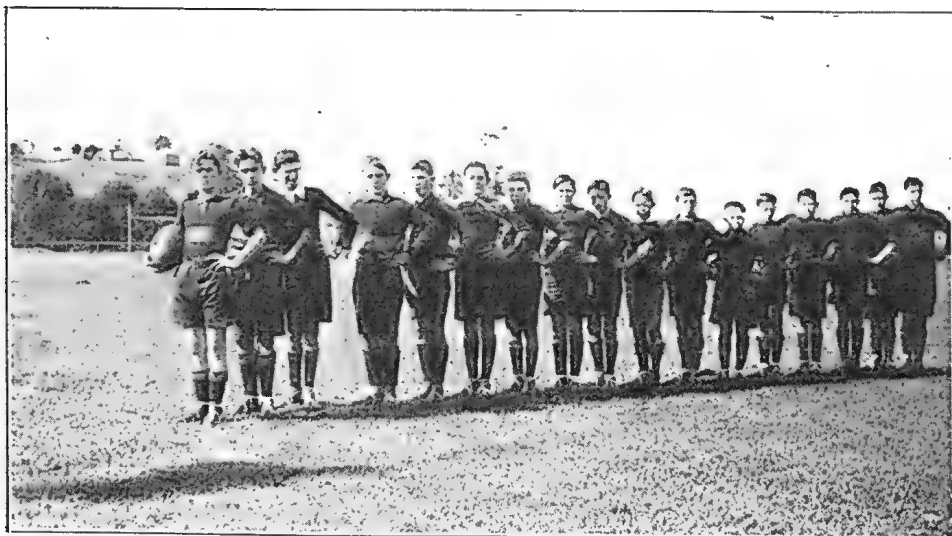


Photo: Murray Studios.

PLATE 4.—NAMBOUR RURAL SCHOOL FOOTBALL TEAM.

SCIENCE NOTES.

BY EDMUND JARVIS, Entomologist.

Under this heading it is proposed to record each month discoveries and observations made at our laboratory relating to insect pests of sugar-cane and their parasites which are likely to prove of general scientific interest.

EARLY STAGES OF *MACROSIAGON* (*EMENADIA*). *CUCULLATA*, MACL.

A hyperparasite of the above genus—viz., *M. pictipennis*, Lea.—has during the past seven years been considered an enemy of our useful digger-wasp parasites, *Campsomeris tasmaniensis*, Sauss., and *C. radula*, Fabr.; having been found from time to time in cocoons of these scoliids collected in the field.

Nothing, however, was known respecting the life-cycle of these remarkable beetles until quite recently (December, 1921), when Mr. W. Cottrell Dormer, Assistant Entomologist, had the good fortune to observe specimens of *cucullata* in the act of ovipositing on the under-surface of leaves of *Ficus opposita* and *Urena lobata*.

The eggs, which are white and of elliptical form, and measure 0.156 by 0.45 m.m., numbered a hundred or more, and were placed close together but without definite arrangement amongst the hairs of the leaf, distributed over an area of about 1 to 2 square inches.

During the period occupied by the egg-stage they were kept under quite dry conditions in glass tubes, and a fortnight later had commenced to darken, becoming black, and finally hatching after 17½ days.

The minute and active triungulin (representing the first larval stage) resembles in general appearance and structure that of a closely related European species (*Rhipiphorus paradoxus*), and, like that insect, probably makes its way into flowers visited by hymenoptera, in the hope of attaching itself to some suitable wasp and being carried into its nest.

A *Campsomeris* wasp was placed by us for a few seconds in a large test-tube containing about 25 triungulins, and then immediately put under chloroform. Examination revealed numbers of these curious larvæ tightly embracing various hairs on the tarsi, clypeus, neck, pronotum, &c., of the digger-wasp. Even in so brief a space of time, and while the wasp was in active motion, they had contrived to jump upon or lay hold of it, and securely attach themselves.

Upon the latter reviving and discovering the presence of its minute enemies, it endeavoured to brush them off, but only succeeded in killing one and removing two others.

Subsequently these triungulins were carried underground by the host, and after oviposition had taken place one of them remained on an egg attached to the paralysed grub for three days, making no attempt to pierce the chorion, but apparently awaiting the appearance of the maggot of the wasp.

Unfortunately, this egg, being injured by an acarid, did not hatch, so we lost the opportunity of observing the behaviour of this hyperparasite towards the very young scoliid maggot.

In all probability its first larval instar, like that of *Rhipiphorus*, is passed inside the maggot of the digger-wasp.

This triungulin, which is figured on the accompanying plate, is a black and almost microscopic insect, barely visible to the naked eye, measuring 0.53 by 0.213 m.m., greatest body length and width; and 0.695 m.m. from front of head to end of anal bristles. By aid of a sucker situated ventrally on the anal segment it is able, when necessary, to stand on its tail, thus leaving all legs free when about to lay hold of insects to be used as carriers.

It appears likely that almost any nectar-loving species of hymenoptera or diptera, irrespective of size or economy, might be made use of by the triungulin, and in this way serve to transport it from flower to flower until its carrier chanced to alight on blossoms habitually visited by scoliid or other burrowing wasps, some of which might prove to be suitable hosts.

I may mention that the leaves of *Urena lobata*, on which eggs of *M. cucullata* are deposited, are glandiferous, two or three cup-like honey-bearing glands being situated on the edge of the leaf, close to the petiole. Perhaps the beetle purposely selects such leaves in order that her offspring may find nourishment prior to commencing their travels, and at the same time be afforded a better chance of meeting with insect carriers in the shape of small flies, &c., which might be attracted to leaves bearing glands of this nature.

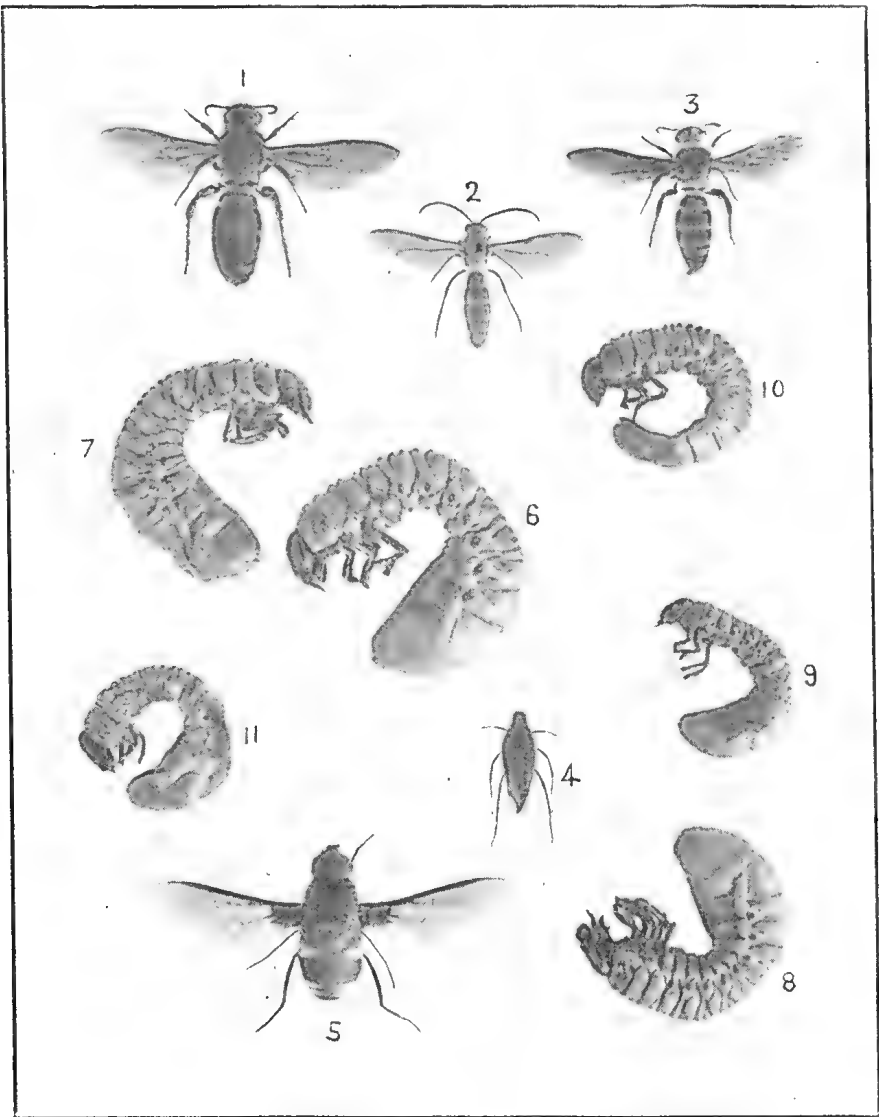


Photo. by E. Jarvis.]

PLATE 5.—*CAMPSOMERIS TASMANIENSIS* Sauss., AND *C. RADULA* Fabr.,
TOGETHER WITH THEIR HYPERPARASITES AND HOST-GRUBS.

(About two-thirds natural size.)

- 1.—*C. tasmaniensis* (female).
- 2.—*C. tasmaniensis* (male).
- 3.—*C. radula* Fabr. (female).
- 4.—*Macrosiagon pictipennis* Lea. (hyperparasitic).
- 5.—*Hyperalonia satyrus* Fabr. (*funesta* Walker).
- 6.—Grub of *Lepidoderma albohirtum* Waterh.
- 7.—Grub of *Lepidiota frenchi* Blackb.
- 8.—Grub of *Lepidiota caudata* Blackb.
- 9.—Grub of *Lepidiota rothei* Blackb.
- 10.—Grub of *Anoplognathus boisduvali* Boisd.
- 11.—Grub of *Dasgynathus australis-dejeani* Macl.

Note.—The grubs were photographed from spirit specimens, and are somewhat shrunken.

The continuous supply of food furnished by these various root-eating Scarabaeidæ, coupled with the fact of our average temperature during autumn and winter being about 73 degrees Fahr., enables species of Campsomeris to breed unceasingly and produce successive generations about every three months.

The lowest temperature recorded by the writer at Meringa during 1919, was 40 degrees Fahr. at 6.30 a.m.; and a few hours later, at 11 a.m., the morning being sunny, plenty of female digger-wasps were seen flying to blossoms of *Sida acuta* and *retusa*.

Grubs nearing the end of the second instar appear to be readily victimised by these scoliids. We have many records, for instance, of wasps of average size ovipositing on small second-stage *Lepidiota frenchi*; and conversely of females below the average size, parasitising big third-stage grubs of *L. albohirtum*.

Such readiness to oviposit on any host-grubs chancing to be available, whether large or small, while naturally enhancing the economic value of these scoliid wasps in Queensland, would add greatly to their usefulness in other countries into which they might be introduced as possible controlling agents against root-eating scarabæid grubs.

The larval stage of the six hosts enumerated above occurs in the Cairns district during the following periods:—*L. albohirtum*, plentifully, from February to July; *D. australis-dejeani*, commonly, from January to May; *L. rothei*, locally plentiful from March to August; *L. frenchi* and *caudata*, and *A. boisduvali*, commonly, at all times.

The table given below, which should be of interest to parasitologists, indicates the extreme measurements met with in adult females of both species of Campsomeris, together with the average length and width of second and third stage grubs of each of the six hosts concerned:—

MAXIMUM AND MINIMUM LENGTH AND WIDTH OF SCOLIID WASPS.

Parasites		Minimum.		Maximum.	
		22 × 5.50 m.m.		30 × 7 m.m.	
	<i>Campsomeris tasmaniensis</i> Sauss.				
	<i>Campsomeris radula</i> Fabr. ..	16 × 6.50 m.m.		27 × 6 m.m.	
Average size of Hosts (natural curved form)		2nd instar.		3rd instar.	
Hosts	<i>Lepidoderma albohirtum</i> Water.	22 × 7.50 m.m.		30 × 12 m.m.	
	<i>Lepidiota frenchi</i> Blackb. ..	16 × 6.50 m.m.		25 × 10 m.m.	
	<i>Lepidiota rothei</i> Blackb. ..	9 × 4 m.m.		14 × 6.75 m.m.	
	<i>Lepidiota candata</i> Blackb. ..	21 × 7 m.m.		29 × 11 m.m.	
	<i>Anoplognathus boisduvali</i> Boisd	16 × 5 m.m.		24 × 9 m.m.	
	<i>Dasgynathus australis-dejeani</i> Macl.	12 × 6 m.m.		18 × 10 m.m.	

FACTORS FAVOURABLE TO THE INCREASE OF "DIGGER-WASP" PARASITES.

AN ABUNDANT FOOD SUPPLY FOR THE LARVÆ.

Owing to some of our root-eating Scarabaeidæ having a two-year's life-cycle, cane-grubs may be found commonly at all times, although occurring in greatest profusion in the Cairns district from March to August.

One species of *Lepidoderma*, three of *Lepidiota*, and one of *Anoplognathus* are freely parasitised by *Campsomeris tasmaniensis* Sauss. and *C. radula* Fabr. The two favourite hosts, however, are *Lepidoderma albohirtum* Waterh. and *Lepidiota frenchi* Blackb.

Although previously reported (Bull. No. 7, Div. Ent., p. 15, 1918) that *radula* would not oviposit on grubs of *Dasgynathus australis-dejeani* Macl., subsequent experimentation by the writer with the autumn brood, during May of the following year, demonstrated that specimens of this wasp bred in our laboratory would very often parasitise larvæ of this Dynastid beetle. The negative results of former experiments in this connection may have been due to the fact that the wasps used in the first instance, had been ovipositing regularly for some days on grubs of *frenchi*, and so become accustomed to the fighting tactics of that species. In the absence of other hosts, virgin females of *radula* meeting with larvæ of *australis-dejeani* in canefields would probably victimise them as a matter of course.

I am inclined to believe that under natural conditions both *radula* and *tasmaniensis*—throughout their aerial existence—usually oviposit for the most part on grubs of the first suitable host encountered by them. We may reasonably assume that a wasp, after such initiatory contact, would profit by its experience, and be able thenceforward, even before entering the ground, to detect the presence of similar grubs on a plantation, and possibly distinguish them at once from those of related hosts that might chance to occur on the same area.

At Gordonvale, the Scarabaeidae attacked represent not only different genera but three distinct sub-families, the larvæ of which, varying as they must necessarily do in habits, and to some extent in structure, would probably adopt slightly different fighting methods when defending themselves from digger-wasps. As an illustration (one of several cases) I may mention that a *bred* specimen of *tasmaniensis* that had from the first been regularly supplied with third-stage grubs of *L. albohirtum*—and during a period of 21 days had paralysed and oviposited on no less than 48 specimens of this host—upon being suddenly caged with a third-stage grub of *Anoplognathus boisduvali*, gave battle as usual, but, was overpowered and cut in pieces by the new host; having, presumably, failed to immediately vary what had become its habitual method of attack in order to meet a changed, and unfamiliar, mode of defence. Strangely enough, the victorious grub in this instance was that of the smaller and less-aggressive of the two hosts concerned. As mentioned by the writer (Bull. No. 7, Div. Ent., p. 21, 1918), the laying of each wasp-egg is preceded by a duel, in which the parasite, although generally the winner, does not always escape unharmed. The seriousness of these subterranean combats is evidenced by the nature of the wounds frequently received. For example:—A specimen of *tasmaniensis* that lived 50 days in confinement, and eventually succumbed to such injuries after laying 65 eggs, was found to have lost ten joints of one antenna, four intermediate tarsal joints, and the same number from its hind feet; while a *bred* specimen of *radula* died from the effects of a gaping abdominal wound, after depositing 43 eggs.

AN ANNUAL PRODUCTION OF ABOUT FOUR BROODS.

In all probability the economic value of *Campsomeris tasmaniensis* Sauss. and *C. radula* Fabr. is mainly due to such factors as a favourable average annual temperature, coupled with an abundant food supply of grubs for the larvæ, which make possible the occurrence each year of at least four generations of wasps.

SPRING BROOD.

The first, or spring, brood is apparently derived from females which have started to lay towards the end of September, the earliest eggs from *radula* having been obtained on the 22nd and 27th of this month on hosts *Lepidiota frenchi* Blackb. and *Anoplognathus boisduvali* Boisd.; and from *tasmaniensis*, on the 27th and 28th, deposited on the latter host. Egg-laying, however, becomes general towards the end of October, and continues into November. Emergence of imagoes from this brood takes place about the middle of December and extends into January. Thus a specimen of *radula*, captured 26th September, upon being supplied, a month later, with the third-stage *frenchi* grubs, laid 23 eggs between the dates 27th October and 25th November. A few of these were destroyed by acari; but, from the remainder eight male and nine female wasps were procured between the 16th December and 7th January. The life-cycle of wasps of this brood is about 47 days; the duration of the egg, larval, and intra-cocoon stages being 3, 8, and 36 days respectively; while the average shade temperature during the period of metamorphosis in the year 1917 was about 77° Fahr.

SUMMER BROOD.

No definite time can be assigned for the commencement of the second generation, as the preceding one merges insensibly into it, but, approximately, the period occupied by this brood dates from the middle of December to the middle of February. Female wasps of the first brood are able to oviposit within twenty-four hours after leaving the cocoons, and, being parthenogenetic, the females need not delay oviposition until after mating. Under natural conditions copulation probably takes place almost at once, as the males, which appear a few days before the females, usually remain near the spot from which they have emerged, flying restlessly to and fro over the surface of the ground, evidently anticipating the appearance of the latter sex.

Such behaviour is doubtless a response on the part of this insect to chemotropic influences induced by the occurrence in the soil of cocoons containing female wasps, and furnishes, indeed, a very striking illustration of tropic reaction. In the present instance this curious force, known as positive chemotropism, actually compelled numerous specimens of male digger-wasps, bred by the writer at Meringa in 1918, to haunt our laboratory verandahs for several days after liberation, instead of accepting their freedom and flying off to the fields in search of food or suitable

partners. During this period of expectancy they frequently entered and flew about the building, and when doors were closed they could often be seen knocking themselves against the glass, outside windows, endeavouring to get back into the room in which we kept breeding-trays containing female cocoons.

With reference to the duration of this second brood, the following summarised statement, derived from comprehensive data compiled by the writer during 1917-18, may be taken as fairly conclusive:—

The average lengths of egg and larval stages of *tasmaniensis* equal $3\frac{1}{2}$ and $7\frac{1}{2}$ days respectively, while the intra-cocoon condition (from 7th October to 11th February, at a mean shade temperature of 87° Fahr.) occupies a period of 36 days for male and $38\frac{1}{2}$ days for female wasps, the minimum and maximum number for the male being 31 and 40, and for the opposite sex 32 and 43 days. The number of eggs obtained from a couple of caught specimens of this species, which were deposited in cages on grubs of *L. frenchi*, was 65, from which were bred fifteen males and sixteen females; but, quite likely, additional eggs may have been laid by these two wasps prior to capture.

Another wasp, which was caught 19th December, and lived 48 days in confinement, deposited no less than 65 eggs, from which resulted 13 males and the same number of females.

AUTUMN BROOD.

Two specimens of *C. tasmaniensis* bred at our Insectary on 11th and 14th March, deposited, collectively, 157 eggs upon grubs of *L. albohirtum*, these resulting in 113 cocoons, from which were obtained, between 11th May and 16th August, a total of 76 wasps, all being of the male sex. Bred males had been confined with these two females for some days in a breeding cage directly after emergence of the latter, but presumably conditions conducive to mating had not been established. Perhaps, the cage used was too small (12 by 15 inches), or did not receive sufficient sunlight. Possibly newly bred males may not be in a condition to copulate until after having flown for a few days in the open. It should be mentioned, however, that a wasp bred here on 5th January, and confined for a time with a male in a small glass jar only 6 in. high, containing damp soil, apparently succeeded in copulating under such seemingly unfavourable conditions, as it deposited 49 eggs, from which were derived 3 males and 11 females. We may assume from the foregoing results that temperature and humidity probably play an important part in this connection. Absence of female wasps in the above-mentioned autumn broods was certainly not due to seasonal influences, for a check experiment conducted by the writer the following year (May, 1919) with female wasps captured in the field, and therefore, presumably, fertilised, proved this autumn brood to consist, like the earlier ones, of wasps of both sexes in about equal proportion.

WINTER BROOD.

Eggs producing this brood are laid in June or July. The cooler weather, as might have been expected, retarded development of the life-cycle stages, and the eggs, for instance, which during summer weather hatch about the third day after deposition, require from 7 to 10 days or even longer during winter, while the period occupied by the combined egg and maggot stages varies from 18 to 24 days, under an average shade temperature of 68° deg. Fahr. These combined stages, however, throughout January (summer brood) occupy a period of only 12 days, the temperature at that time being about 82° deg. Fahr.

Nine specimens of *tasmaniensis*, captured between the 8th and 13th July, laid collectively 92 eggs on third-stage grubs of *albohirtum*, which ultimately yielded 20 male and 8 female wasps.

These emerged between the 8th and 26th October.

It will be seen from the above that these four broods, if taken together, represent a period of about 270 days. This, if extended over the twelve months, would permit of an interval of about 30 days between each brood, thus allowing a wide margin for various natural breaks that hinder breeding activities of the wasps, such as drought conditions, excessive wet, cloudy days, &c.

FACTORS AFFECTING THE EGG STAGE OF OUR DIGGER-WASP PARASITES.

When dealing with subjects of such complexity, one cannot venture to do much more than outline a few of the chief controlling influences concerned; leaving almost untouched the intricate workings of natural control, which affect in varying degrees the multitudinous forms of organic life.

The eggs of *Campsomeris tasmaniensis*, Sauss., and *C. radula*, Fab., are placed singly on the mid-ventral area of the third or fourth abdominal segments of cane-grubs, and measure on an average about 3.20 m.m. by 0.90 m.m. They are greyish

pearly-white, of elongate cylindrical form with rounded ends, one of which (the less obtuse) is lightly glued by the wasp to the skin in such manner as to leave the egg projecting at right angles from the body.

Although placed within easy reach of its hind tarsi, the grub when normally paralysed does not disturb the egg, owing apparently to the sting having caused its legs to assume a bent contracted position, pointing towards the head. Hosts insufficiently paralysed, however, are able to move their legs with comparative freedom, and in such cases the egg of the parasite is almost certain to be detached sooner or later through accidental contact with one of the tarsi, a very slight touch being enough to knock it off.

During the course of experimentation it was found that these loose eggs, if artificially gummed to the ventral surface out of reach of the feet, hatched in due time, and the resultant larvæ matured in a natural manner. When two larvæ were forced to feed on the one grub, duration of the larval period was shortened, both spinning cocoons at the end of six days, and these ultimately producing a wasp of each sex. In an experiment made with five eggs artificially gummed to the body of a single grub, four of the parasitic maggots fed up successfully and spun cocoons, while the fifth, which had been put on the anal segment of its host, died, when half grown, from having imbibed juices contaminated with ingested earthy matter, which is always present in the last body-segment of our cane-grubs, and had evidently disagreed with it. One male and three female wasps were obtained as a result of this curious experiment, one of these being an abnormally small specimen of *C. radula*, measuring 14 m.m. in length.

Under natural conditions, the larva, when hatching, at the end of the third day, ruptures the free head-end of the egg, and, remaining in the pliable chorion, bends its head downwards until able to reach the skin of the grub; the still-attached base of the eggshell affords a support to steady the tiny parasite while biting through the tough skin, and buries its head securely in the living tissues of its host.

When emerging from a detached egg which has fallen on the soil, the young maggot appears quite helpless and unable to adapt itself to altered conditions, or to reach the body of the grub lying so close at hand. We may, I think, assume that under such circumstances fully 90 per cent. of eggs rubbed off by semi-paralysed grubs would inevitably perish, and that each lost in that way would, in five cases out of ten, represent a loss to the next brood of about thirty female wasps.

DESTRUCTION OF EGGS BY ACARI.

Whilst breeding hundreds of digger-wasps at Meringa (1917-18), about 20 per cent. of eggs laid by these parasites were destroyed by Acari, which occur commonly on our various scarabæid grubs.

These Rhizoglyphid mites, according to Tryon, do not attack the grubs, but merely use them as carriers on which to travel through the soil until reaching congenial food. Whilst habitually roaming freely over the body they may, in the first instance, when meeting with a wasp's egg, be induced to feed on the sticky secretion attaching it to the skin of the host. The delicate chorion being soft and easily injured, such interference would soon result in rupture of the base of the egg, followed by an exudation of albuminous matter. This rich food proves very attractive, as, when eggs are so punctured, mites traversing the body soon discover and congregate around the tempting morsel. Acari occurring on a paralysed larva do not, so far as observed, feed on its body until life has departed and decomposition set in. In one instance, however, they were seen by the writer to devour a fully grown maggot of *Campsomeris tasmanicus*, Sauss., that, having been forced to pupate out of a cell, had been unable to spin a complete cocoon. The mites in this case did not attack the living maggot until after some decaying remains of the host-grub on which they were feeding had been removed from the cage.

EGGS ATTACKED BY FUNGUS.

In a few instances a fungus (of undetermined species) was observed enveloping eggs and very young larvæ, which had received no mechanical injury of any kind, so apparently entomogenous in nature.

BACTERIAL DISEASE OF EGGS.

About 5 per cent. of eggs of *Campsomeris* laid at our Insectary were destroyed by some obscure disease (undetermined), probably of bacterial origin. This mortality was not due to infertility, since other eggs deposited subsequently by the same wasp produced larvæ, and ultimately imagoes of both sexes.

The first indication of this disease appears near the head-end in the form of a few red lineolate marks, which after some hours become suffusions, until finally the entire central portion of the egg clouds over with pale rusty-red. In other cases the internal fluids gradually turn brown, the egg becoming more and more misshapen, until ultimately breaking down into a viscid mass.

The latter disease was recorded for the most part during October and November, the average shade temperature at the time being about 78 degrees Fah.

MORE LIGHT ON POWER ALCOHOL.

The possibilities of securing an abundant source of alcohol for power purposes affords a question which deeply concerns many regions of the world. The British Department of Scientific and Industrial Research is continuing investigations of this important problem. A special officer was appointed to collect data from different parts of the world as to the possibility of producing alcohol in bulk from local vegetable materials. The actual building up of alcohol from various substances, such as calcium carbide, has also been carefully studied. At present the results attained are not altogether promising; and the British authorities consider that the best prospect lies in evolving a process, either mechanical or bacteriological, of producing alcohol commercially from tropical vegetation or waste vegetable materials.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 12.

THE IVORYWOOD.

This tree is a tall scrub species, ranging from the Clarence River in New South Wales to Mount Perry, near Bundaberg, Queensland. It is known to botanists as *Siphonodon australe*. On account of the resemblance of the fruit, in size and shape, to the large yellow guava, it is sometimes known as the Native Guava. The trees attain a barrel diameter of 2 feet, and a height of about 130 feet; they are very tall, slender trees, as a rule. The barrel is not prominently flanged. The bark is mostly furrowed or wrinkled and is often scaly, is grey in colour, and when cut is seen to be light-brown, with a flesh-coloured innermost layer. It measures three-eighths of an inch thick on a tree with a barrel diameter of 2 feet. The trees are generally readily distinguished from other scrub trees by chipping off the outermost layer of bark and exposing a yellow or ochre-coloured substance in the interior of the bark. This deeply coloured substance can be found beneath the outer layer of bark in most of the trees. The wood is white or pale yellow, and very closely grained. It has been suggested as a substitute for English Box, a timber which it closely resembles in appearance.



Photo, by the Authors.]

PLATE 6.—THE IVORYWOOD (*Siphonodon australis*).

A tree, with a barrel 2 feet in diameter, in the Imbil Scrub.

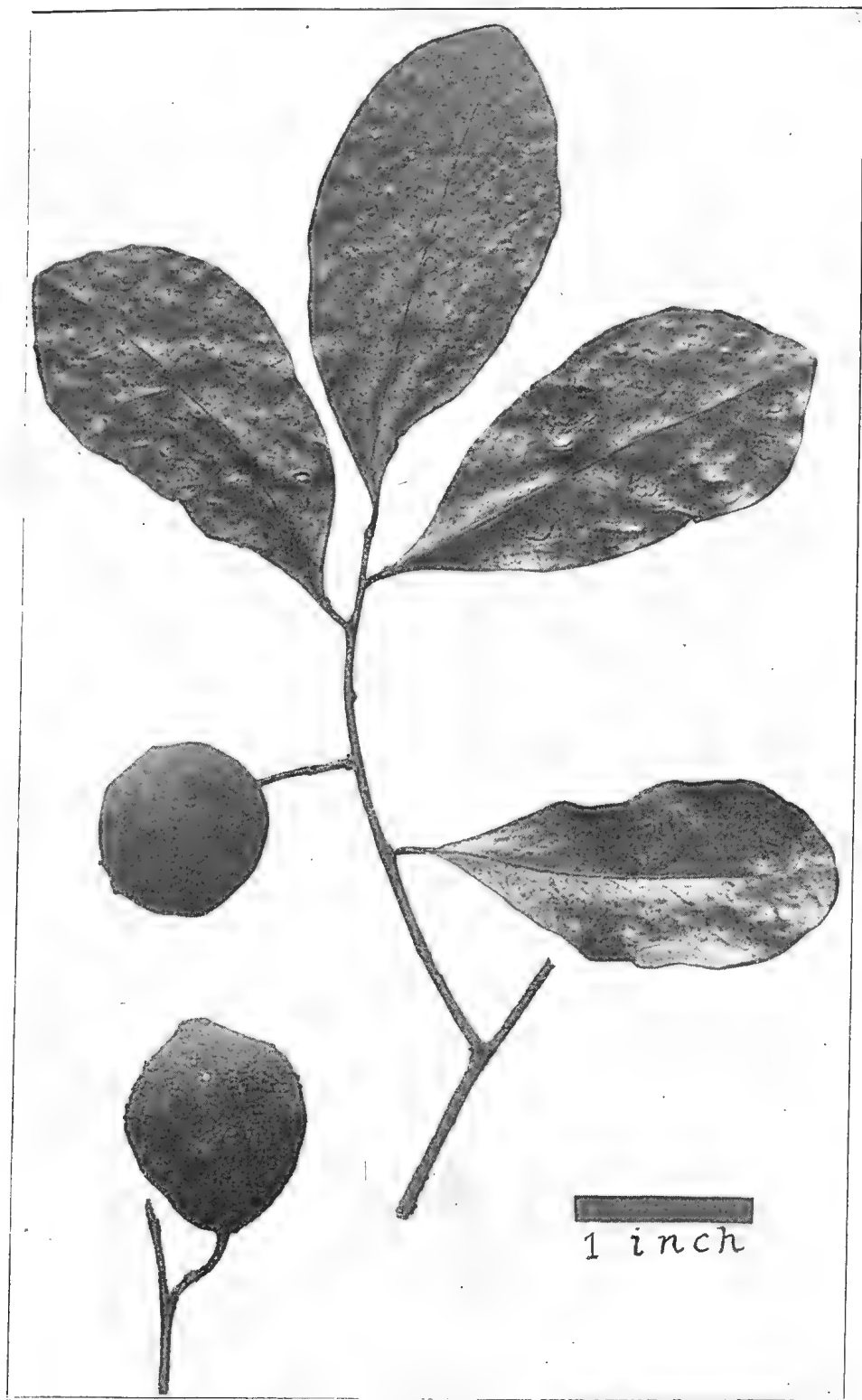


PLATE 7.—THE IVORYWOOD (*Siphonodon australe*).
Showing leaves and fruit.

THE BANANA BEETLE BORER.

The Hon. W. N. Gillies, Minister for Agriculture, has made available the following memorandum on the "Banana Beetle Borer" by Mr. John L. Froggatt, B.Sc., Entomologist of this Department:—

"In the banana-growing industry of Queensland, there appears to be a large number of growers who either do not understand how to detect or are unaware of one of the worst pests they have to face, and in some cases, combat—namely, the banana beetle-borer. Through this lack of knowledge many have found, to their cost, that they have either purchased an infested plantation, or, by introducing suckers from infested areas, have brought in the beetle-borer. Often before its presence is discovered it has become well established and has caused appreciable damage to the plantation.

"There are many banana-growers, and others interested, however, who consider that the beetle-borer is not a serious menace, and on this account do not worry and let the beetle continue its work of destruction unhindered. By so doing, they are laying up an abundant store of trouble not only for themselves but also for their neighbours and the district generally. Such plantations form ideal breeding-centres from which the pest may easily become disseminated.

"It is fully recognised, on the other hand, that there *are* growers doing all they can to combat the pest and many others who doubtless will also co-operate in checking the increase of the beetle-borer as soon as they realise the seriousness of the problem.

"After carrying out extended observations in the field, it is most apparent that the banana beetle-borer *is* increasing and spreading; this is particularly marked in plantations where control measures are either neglected or carried out in so insufficient a manner as to be of little or no value.

"In laying out a plantation there are two very necessary precautions to be observed—

1. Make sure that the plantation from which the suckers are being obtained is free from beetle-borer infestation.
2. Do not plant alongside or adjacent to infested areas. Where this has been already done, precautions must be taken to prevent the beetle-borer spreading into the new plantation.

"The founding of a clean plantation rests very largely on the strict observance of these precautions.

"To consider the reasons for these statements—

1. If a plantation be infested, even allowing that the suckers when dug out of a stool may be free from beetle-borer, yet while they are lying on the ground (acting for the time as baits) beetles may be attracted to and lay eggs in some, if not all, of them. The eggs, being very difficult to detect, may be entirely missed, even should an examination of the suckers be made. Where the suckers are large and vigorous and the season favourable, the suckers may develop into plants, even with one or two larvæ (grubs) in them. Once the beetle has become established in a plantation, it will require a great amount of constant systematic work to keep it in check.

Butts, sometimes used for planting, are more easily examined than suckers, as, if infested, they should show larval tunnels on being opened up. Even in cases where they appear clean, however, eggs may be present and be overlooked.

2. A number of instances have been noted where plantations have been laid out alongside infested areas and have subsequently become infested. Where this is found to have been done, corm baits should be laid between the old and new plantations in alternate rows and examined periodically. Whenever practicable, it is advisable to dig out and destroy the infested stools, and baits should be laid out on the sites of the stools. This will help to hinder the beetles migrating, and the destruction of those trapped will further minimise the risk of infestation.

"The presence of beetle-borer at any stage beyond that of the egg stage, in a plantation, is most readily detected in the old butts, &c., in the stools or in stems or old corms lying on the ground. By cutting these open, the beetle-borer is evidenced, if present, by the larval tunnels; larvæ and beetles may be found. Suckers often, though not always, give an indication of beetle-borer by presenting an unhealthy appearance, noticeable particularly in the leaves. On being removed and cut up, if infested, larval tunnels will be seen in the corm.

"Where a plantation is found to be infested, all badly infested stools, and in slightly infested stools all old butts, &c., should be dug out and chopped into small

pieces; stems on the ground should be split lengthways. Burning, where practicable, is the most effective, of course. By this means natural decay and drying-up proceed very rapidly, and the grubs present are unable to reach maturity, while the butts and stems cease to be possible breeding-grounds. Corms dug out of the stools and left lying on the ground have been found to be breeding numbers of this pest *four years afterwards*. Stems cut down after bunching and left on the ground have been found to be breeding considerable numbers of beetles many months after being cut down. The rotten material of decaying stems also acts as harbourage for beetles. As soon as the stools are cleaned of the old material, large pieces of clean corm should be laid, cut surface downwards, flat on the ground, to act as baits, and the beetles found on the under surface of the bait, or just underneath the soil under the bait, removed and destroyed. These baits should be removed after about ten to fourteen days and destroyed, because eggs will be laid in them. As a result of tests carried out in the field, it has been found that the beetles are, apparently, in the greatest numbers in the immediate vicinity of the stools, so that the best positions in which to lay baits are inside and just outside the stools. If this work of prevention be thoroughly and systematically carried out, a great deal can be done to check the increase and spread of the pest, *but it must be carried out continuously to be effective*.

"To briefly describe the different stages in the life of the beetle—

"*The Egg* is white, and about one-twelfth of an inch in length. It is very difficult to detect in either plants or suckers; generally it is laid at the junction of the stem and the bulb, lying just under the surface of the plant.

"*The Larva* (or grub) when full grown is slightly more than half-an-inch in length, and rather stout. The body is white, with the head dark reddish-brown. It is the grub that causes the damage to the plant.

"*The Pupa* is white and about half-an-inch in length. It is nearly always found just under the surface of the bulb (below ground level in cases where the corm is in the ground). Just before full development is reached and the beetle is ready to emerge, the pupa shows a slight colouration (yellowish to reddish-brown). This is a resting stage.

"*The Beetle* (belonging to a group of insects commonly called weevils) is just under half-an-inch in length; it is black in colour and has a long, slightly curved trunk in front of the head. When disturbed it lies for a considerable time as if dead. Where it is present in a plantation it will be found in old corms and rotting stems or in the rotting butts in the stools.

"Many queries (and also many wild statements) are made on the subject of natural enemies (or parasites) of the banana beetle-borer. So far only one natural enemy of the beetle-borer is known in Queensland. This is the larva of another beetle which follows up the tunnels made by the grubs of the borer, and which has been observed to attack both the grub and the adult beetle. This parasite has only been found on three occasions, on two of which only a single larva was seen.

"Any positive information on this subject will be welcomed, as it is an important one."

In a previous report on the results of his work in the Southern Coast districts of Queensland, Mr. Froggatt cites two cases which were examined thoroughly in the early part of 1921—No. 1 in April, and No. 2 in January.

The conditions in the two plantations were similar, except as to age; both were well sheltered and below the ridge. No. 1 was about eighteen months old; No. 2, about four years. The depredations of the pest were approximately the same in both cases, being but slight, and localised in a small area.

In No. 1 plantation, on the discovery of the beetle-borer the owner immediately began to systematically destroy all infested corms and stems, and to lay "baits" in and around infested stools. These measures were carried out for several months. In July, 1921, this plantation was again carefully examined, when very little trace of beetle-borer infestation was found. Towards the end of 1921 this plantation was sold, and the new owner did not carry on these preventive measures. In May, 1922, beetle-borer infestation was found in approximately the same area and in apparently about the same numbers as when first found. Only a small number of old corms and cut stems were found to be infested, and the plantation looked very healthy.

In No. 2 plantation the pest had been allowed to progress almost unchecked, with the result that when a further examination was made in March, 1922, practically every old corm and cut stem was found to be riddled by the beetle-borer, as also were corms and stems in the stools, and this over a greatly increased area. In this time the plantation had gone back tremendously. This comparison, which was only one of many, showed, on the one hand, what could be done by consistently and systematically carrying out preventive measures, and, on the other, what happened through neglect of necessary precautions.

POULTRY.

SELECTION OF LAYERS.

The "Journal of the Department of Agriculture," Union of South Africa (April, 1922), publishes the following very useful and instructive paper by Professor A. Owen-John, F.B.S.A., Lecturer in Poultry, Grootfontein School of Agriculture, Middleburg, Cape:—

"Much has been written during the past few years on the very important subject of selection of layers. We, in South Africa, have not been backward in applying the various methods put forward from time to time as indicative of productivity in our laying breeds of poultry. It is by no means a difficult matter to select the layers at the end of the laying season, or after a fair period of productivity, as then the lack of pigmentation or bleaching in the various sections is sufficiently pronounced. The greater difficulty is to select the prospective heavy producer either at the commencement of her laying period or even before she has commenced to lay. It is in this connection that it is desired to make a few observations on the selection of layers.

"During the past three to four years I have carried out investigations at this Institution with a view to finding certain characters which could be considered indicative of high producing capacity in young birds. The method of procedure adopted has been as follows:—

"We have seventy-two individual test pens where the most promising pullets are tested out for twelve months; this test usually commences either in March or April. The breeds used in the test have been:—South African Utility White Leghorns, Brown Leghorns, White Wyandottes, White Orpingtons, and Buff Orpingtons.

"The ages of the various birds are from five months in the light breeds to seven months in the dual-purpose breeds.

"When the seventy-two birds are selected and allocated to their individual pens, a complete description is taken of each bird, and entered up on the back of the record sheet; no detail is omitted. The test is carried out for the year. Each egg laid is entered up according to date and grade—viz., first, second, or below grade, as the case may be. During the last week of the test another detailed description is taken and entered up on the back of the record sheet immediately below the first description, and comparison made between both, also with the record put up by the individual.

"In this way useful information has been gathered. Further, each year I handle large numbers of birds in the course of itinerary duties, when grading and mating stock, inspecting private plants, and judging at shows. Many of the birds so handled have been tested or are about to be tested in private as well as public laying tests, giving thus a still wider field for obtaining information.

"From the foregoing investigations we find that there are almost invariably found in pullets certain characters that will prove the birds to be good producers, and, therefore, of great assistance to the breeder when selecting his birds.

"In the first place, the head or skull should be of medium length, inclined to long (not short, as usually described). We have found this to be pronounced in all cases, particularly in Leghorns. Moderate length from back to front or base of beak, not snaky, with good depth from crown to underside, and of good width across the top. Beak of moderate length and stout. Eye bright and full, standing well out on each side of the head. The shape of the eye is important; the round eye is not so desirable as the oval shape.

"The neck should be of medium length, inclined to long, well covered with feathers and curving gracefully on to the body. The short neck is an indication of a sluggish disposition or an inactive bird; consequently a poor layer. Length and depth of body are essential, with good width of back, allowing full play for the ovaries, the depth of body, especially toward the posterior of the bird, denoting capacity. This should not be confused with a short breastbone, which would naturally allow sagging of the abdomen as found in some birds, and may be mistaken for indications of capacity.

"The pelvic bones (and there is great contention as to whether they should be very fine or not) we have found to vary in thickness or fineness, showing no particular uniformity in this respect, but always pliable in the good producer. The thickness of bone may be anything from one-sixteenth to five-sixteenths of an inch; the pliability is likely to increase with production. In the indifferent producer it is rigid with no springiness even in the pullet, although its thickness may be the same as the good producer. The shape of the pelvic bone is also important; it should curve gracefully toward the vent with no evidence of being hooked at the points. Width between the points of the pelvic bones, and again depth from there to point of breast bone, is important. This varies, of course, in the pullet about to lay, and excessive measurements cannot be expected, but there must be indications of reasonable measurements between these points, such as $1\frac{1}{2}$ to 2 fingers width between points of pelvic bones and $2\frac{1}{2}$ to 3 fingers width between pelvic bones and point of breast bone.

"When testing these sections with the hand, the good producer will give evidence of a springiness of frame expanding with ease to the touch of the hand.

"The texture of abdominal skin is another sound indication of laying qualities, showing fineness and elasticity, with no tendency to coarseness. This quality is found to increase with production, and is always present even during the bird's period of rest while moulting. I have not yet handled a hen with a coarse, unelastic abdominal skin which could be accused of putting up a good laying record.

"We have come to the foregoing conclusions from actual tests carried out as stated above. It is felt that it would be superfluous to deal with the necessity of evidence of health, vigour, and constitution in the high producer, as this essential should be understood sufficiently well.

"We have followed in our selection of stock annually the lines indicated with a marked degree of success. All birds used in these tests are line bred. It is surprising how little change is to be found in the description taken at the commencement and the one taken at the end of the test, the only marked difference being that of the greater width between points of pelvic bones and depth between those and point of breast bone; also, as above stated, an increased fineness in texture of abdominal skin. Several of our test birds each year, among the light breeds, show a marked growth of spurs almost like a male bird, toward the end of the test.

"There is one other item which may be of interest, although not bearing on the subject; it is usually accepted that the dual-purpose breeds of poultry are superior for winter egg production. Our altitude is 4,100 ft. above sea-level, our winter is extremely dry, but cold and inclined to be windy, yet the White Leghorns prove infinitely superior winter layers to any of the dual-purpose breeds, and yet these breeds appear to stand the extreme heat of summer better than the light breeds."

SETTING EGGS.

If you are using an incubator, set only eggs that you would consider the best shape and size for the breed, carefully follow the instructions of the manufacturer, and use only a machine that has a good reputation. Usually a cheap machine is dear at any price.

The best place to run an incubator is in the cellar where there is fairly good ventilation. A little moisture in the atmosphere is an advantage, and the steady temperature makes the location far more desirable than in a room in the house.

If the machine is of a reliable make, and good fertile eggs are used, with an accurate thermometer registering $102\frac{1}{2}$ degrees at the level of the top of the eggs without too much variation throughout the incubating period of 21 days, you should secure a hatch equal in number and condition of chicks to any that you might get under natural conditions with hens incubating a like number of eggs.

When oil lamps are burned without cessation for long periods, as they are with incubators, there is always an element of danger, unless proper precautions are taken. Only the best grade of oil should be used and the wick and burner kept scrupulously clean.

A little moisture is supplied to the egg chamber in the most convenient manner by the use of moist sand in a tray under the eggs. It can be withdrawn if the moisture is excessive, and returned to the machine if the air cell in the egg shows signs of too rapid evaporation. It is safe to say that more hatches are spoiled through lack of moisture than otherwise, but it is possible to err in either direction. Ability to recognise moisture conditions and requirements will be attained only with experience.

The success or failure of your whole year's work may depend upon your efforts in the incubation season. Whether you hatch by incubator or by hen, April is the month that gives best results.

For a hen, use a nest that can be kept closed except when the hen is off to feed. Test out the eggs on the seventh day. In the early season this sometimes makes it possible to put all the fertile eggs of two settings under one hen and reset the other, thus saving valuable time.

Prepare the setting nest with care, clean and spray, and, when dry, place a moist sod, that has been shaped to fit and hollowed a little in the centre, in the bottom of the nest box. Cover with a layer of fine hay. Dust the hen with flowers of sulphur or other reliable lice killer, and set on eggs that are normal in size and shape for the breed. Keep whole corn, grit, and clean water within easy reach, and see that she is off once a day and returns to her nest promptly in cool weather.

At the first sign of pipping, close up the nest after making sure that the hen has a full crop and a drink, and leave her alone till the hatch is complete. Remove shells and unhatched eggs, and allow her to remain on the nest with the chicks until showing signs of uneasiness. Remove to a clean, well-disinfected coop with clean, sanded floor.

SUGAR : FIELD REPORTS.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report from the Southern Field Assistant, Mr. J. C. Murray:—

“During the month the cane-growing areas of Maryborough, Pialba, Yerra and Childers have been visited.

“*Maryborough.*—Very dry weather has considerably retarded the growth of cane at this place. The canes are presenting a wilted appearance, and if the drought continues some of the cane will be too far gone to successfully ratoon. However, there is still a chance of a fair crushing. The varieties holding out and showing greater hardihood than others are M.1900, D.1135, and Striped Singapore. No disease is in evidence, nor is damage being done by insect parasites. Efforts should be made by the growers to obtain a greater range of cane varieties, also to do more local experimenting with chemical fertilisers and, most important of all, to cultivate thoroughly and to continue to cultivate, until it is impossible to get into the cane. It is only by intensive cultivation of these soils, combined with the introducing of as much vegetable matter and animal manure as possible, that the successive dry stages can, in a measure, be combated.

“On much of this Mary River country, lighter ploughs than those generally in use could be utilised. This would mean a saving of horses, greater pace, and consequently finer tillage. The use of the disc harrow would in some cases be of a decided advantage. All these measures tend to give the soil better texture.

“*Pialba.*—This area is looking very dry, but the cane appears to be in good condition. No disease is causing deterioration, and insect parasites have, so far, not attracted the farmer's attention. A visit was made while at Pialba to Takura, where there are a number of growers. The farmers' prospects in this locality were very fine until the dry spell started. The cane, however, did not wilt rapidly, probably owing to good previous cultivation and maintaining of the sweetness of the soil by efficient drainage. Good drainage is of the utmost importance in cane cultivation. Plant roots must have air, and this is impossible if they are resting in water.

“Some of the growers at Takura have considerable areas of cane under cultivation and deserve to make progress. Pulverised limestone has been used in places, but the results are negative. The reaction of the soil is, on an average, slightly alkaline. Green maize could be ploughed under to advantage as a means of supplying humus.

“Varieties doing best are 1900 Seedling and Demerara 1135. Q.813 should do well here; also Black Innis and H.Q.285. Growers are advised not to cut the 1900 Seedling too early.

“*Yerra.*—This area is not suffering so badly from the lack of rain. This may be on account of the heavy scrubs and forest that abound, which make for more humid conditions, even where rain does not actually fall. The farmers, too, are cultivating well, realising that this is the essence of farming under dry conditions. Much good land still remains to be opened up round Yerra, and better roads are absolutely essential if the people are to have comfortable access to their railways and markets. The unnecessary destruction of timber is to be discouraged in these parts. Trees and scrubs contribute to the rainfall, and settlers and timber-getters should keep this in view.

“Regarding varieties on that part of Yerra which was inspected, Striped Singapore is making easily the best showing. This cane is exhibiting great hardihood and displaying all the characteristics which commend a variety to the farmer. To keep Striped Singapore in this condition, care should be exercised in plant selection, as the cane is generally considered susceptible to the disease known as gumming. 1900 Seedling and D.1135 are making a fair showing, especially the former.

“The farms in the Yerra district are not as accessible to the plough as on most cane-growing areas; consequently it is rather surprising the farmers have done the cultivation they have.

“Childers.—This important sugar centre is demonstrating at present the vicissitudes of the cane-farmer. Three months ago a great crop was in view, but subsequent dry weather will reduce the original estimate many thousands of tons. Much of the cane is still green, especially the 1900 Seedling, but the yellow appearance indicating the effect of drought is beginning to show in most fields.

“Everything possible in the way of good cultivation has been done by the farmers, and if the rain fell immediately there would still be a good season, owing to the rapid response of the Childers soils to good weather conditions. This would apply especially to the 1900 Seedling and other varieties which are usually cut about mid-spring. The growers are advised to concentrate on getting greater supplies of Q.813 for planting, and also early maturing varieties, such as Black Innis and H.Q.285, preferably the latter. Very little fertilising is being done at present owing to the dry weather. There is no dearth of water in the drains and creeks, all of which are running strongly.

“Dallarnil.—There is not a great deal of cane grown here, but a very fine sample of this product was in evidence at Mr. Hambleton's farm. The variety was Striped Singapore, and, considering the stretch of dry weather, has done remarkably well. The soil round Dallarnil is, on an average, a fairly rich loam, and with anything like an average rainfall it should produce good cane. Other varieties doing well at Dallarnil are M.1900 Seedling, Hybrid No. 1, and Q.1098. Mr. Brookfield has the two latter growing on his place; also Shahjahanpur No. 10 and Q.970. These two canes, however, are not doing very well. The Hybrid No. 1 is a good cane, and is worth looking after. This farmer obtained these canes from the Sugar Experiment Station at Bundaberg some two years ago, and they would probably have all grown well only for the drought.

“Booyal.—There is some good land in this district under cane, but the dry weather will considerably reduce the original estimate. This is disappointing for the grower, as several have put in much hard work on their properties planting cane. However, the district is holding its own with the other areas under review, and cane-planting is justified here with normal rains. The best variety appears to be Striped Singapore. D.1135 and 1900 Seedling are also making a fair showing.”

SHOW DATES 1922 AND 1923.

Show society secretaries are invited to forward for insertion in this list dates of forthcoming shows. Alterations of dates should be notified without delay.

Gayndah: 4th, 5th, and 6th July.

Nambour: 5th and 6th July.

Townsville: 5th and 6th July.

Charters Towers: 11th and 12th July, 1922.

Gatton: 12th and 13th July.

Proserpine: 13th, 14th, and 15th July.

Rosewood: 19th and 20th July.

Caboolture: 20th and 21st July.

Mount Gravatt: 22nd July.

Barealdine: 25th and 26th July.

Crow's Nest: 26th July.

Pine Rivers: 28th and 29th July.

Wellington Point: 29th July.

Coorparoo: 26th August.

Kenilworth: 31st August.

Beenleigh: 1st and 2nd September.

Zillmere: 1st and 2nd September.

Gympie: 7th, 8th, and 9th September.

Wynnum: 9th September.

Imbil: 13th and 14th September.

Laidley: 13th and 14th September.

Sherwood: 16th September.

Rocklea: 23rd September.

Kilcoy: 28th and 29th September.

Esk Camp Drafting: 4th and 5th October.

Pomona: 4th and 5th October.

Southport: 6th October.

Enoggera: 7th October.

WARWICK.—Eastern Downs Horticultural and Agricultural Association: 13th, 14th, and 15th February, 1923.

GENERAL NOTES.

A Possible New Industry : "Shammy," or Oil Leather.

We frequently receive from men on the land requests for information as to the tanning of opossum and calf skins. The following method of converting skins into the soft so-called "shammy" leather may be of interest to them. Shammy, we may say, is a corruption of the pronunciation of the Swiss-French name of the small deer, the chamois, because it was first produced from the skin of the chamois. The process is thus described by the "Agricultural News," Barbados:—

"The large consumption of imported shammy leathers in the West Indies for motor-car, carriage, and other cleaning purposes, the large export of raw goat and sheep skins to America, and the ease with which goat and sheep can be raised, especially in the Northern Islands, have amongst other considerations suggested the idea that shammy leather making might well form a suitable minor industry for the West Indies.

"In accordance with this idea, the following notes have been prepared for the benefit of those readers who may care to carry out experiments:—

"Shammy leather manufacture is the oldest system of leather-making; but well-shammied leather requires the exercise of much care and numerous manipulative processes. These processes are partly mechanical, partly chemical, and partly bacterial; and although the following describes these processes in a general way, it is likely that they may need modification under tropical conditions such as obtain in the West Indies. The information given is only intended as a guide to the way shammy leather is made, on a small scale, in England and France.

"1. *Skins*.—Sheep skins are chiefly used, but goat and other skins are also employed.

"2. *Soaking*.—Only dried skins need to be soaked.

"3. *Unhairing*.—Soak in slaked lime solution for several days (6 lb. of burnt lime to 100 gal. of water—rain water is best). Add $\frac{1}{4}$ per cent. sodium sulphide on the weight of the skins as a sharpener. This will reduce the time required for immersion.

"4. *Splitting*.—The skins are split after the completion of the liming process, and the loose and fatty middle layer is removed by a sharp knife, stretching the skin on a convex plank if possible.

"5. *Drenching*.—Part of the lime is then removed by 'drenching.' The skins are put in an infusion (4 parts of bran to 1,000 parts of water). When the skins become white and soft and retain the impression made when probed with the finger, the process is finished.

"The change is brought about by the acids produced in the fermentation of the bran. The drenching process can be brought about much more quickly by a solution strength of 2 lb. of lactic acid in 100 gallons of water, instead of the bran infusion; but the bran infusion is probably much cheaper.

"6. *Removal of Water*.—After draining the skins, as much water is removed as possible by pressing. This allows for the absorption of oil in the next process.

"7. *Oiling*.—This is the essential process. The skins are staked out on a board, fish oil is added, a little at a time but evenly, and the skins are hammered severely with a heavy mallet. (A machine called 'a fuller stock' is used on a large scale.)

"8. *Drying*.—As soon as the skins are saturated with oil, they are hung up dry; but do not let a skin dry until it has properly and evenly absorbed its oil.

"9. It may be necessary to repeat 7.

"10. *Heating*.—Next heat the skins in a stove. This causes some of the oil to oxidise. Though the skins must be heated to a fairly high temperature, care must be taken not to let them burn. As soon as they turn yellow and give off a peculiar odour, not like fish oil, the process is complete. Lay out the skins to cool.

"11. It may be necessary or better to give the skins a little extra natural heating by packing them in a box and letting them sweat.

"12. *Washing*.—The skins, after cooling, are dipped in water and then wrung or hydraulically pressed. They are then ready for use."

Spotted Wilt of Tomatoes.

Tomato plants infested with the spotted wilt disease have been under observation in the suburban gardens (Sydney) throughout the winter, to decide whether or not the disease winters on the old plants. One old vine still alive is at present (11th July) showing the typical symptoms of wilt—i.e., the brownish appearance of the leaves and of the young shoots. As some growers had already commenced (March) to plant out young seedlings, the possibility of their being infected from old vines is apparent. While the exact method of transmission of the disease from plant to plant is unknown, it would be wise for growers to destroy all old vines by burning before commencing to raise early seedlings.—“Agricultural Gazette of New South Wales.”

Australasian Association for the Advancement of Science.

We have received from the hon. secretary of the Agricultural Section of the Australasian Association for the Advancement of Science, Mr. B. C. Aston, the following notice of the meeting of the Association to be held at Wellington, New Zealand, in January next:—

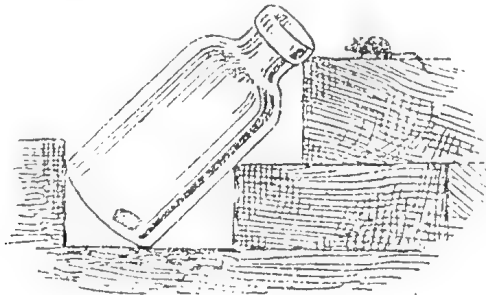
The Wellington meeting of this Association will be held in January next. This will be the third time that the Australasian Association for the Advancement of Science has met in New Zealand, previous meetings having been held in Dunedin and Christchurch.

It is desired to make the Agricultural and Veterinary Sections outstanding features of the meeting, and owing to the comparatively large number of professional agricultural officers employed by the Government and various institutions in New Zealand, compared with other States of the Empire, it is anticipated that the programme of these Sections will be filled to the utmost limit.

The Session of the Association is fixed to begin on 9th January, 1923, but authors of papers which they desire to read or have read at the meeting should send in the titles as soon as possible to the hon. secretary in order that suitable arrangements may be made to ensure a proper treatment for each contribution. It is only desired that the titles of papers should be sent in at first, but the whole of each paper, with an abstract prepared by the authors, should be in the hands of the section honorary secretary not later than 27th January, 1922.

A Useful Mouse-trap.

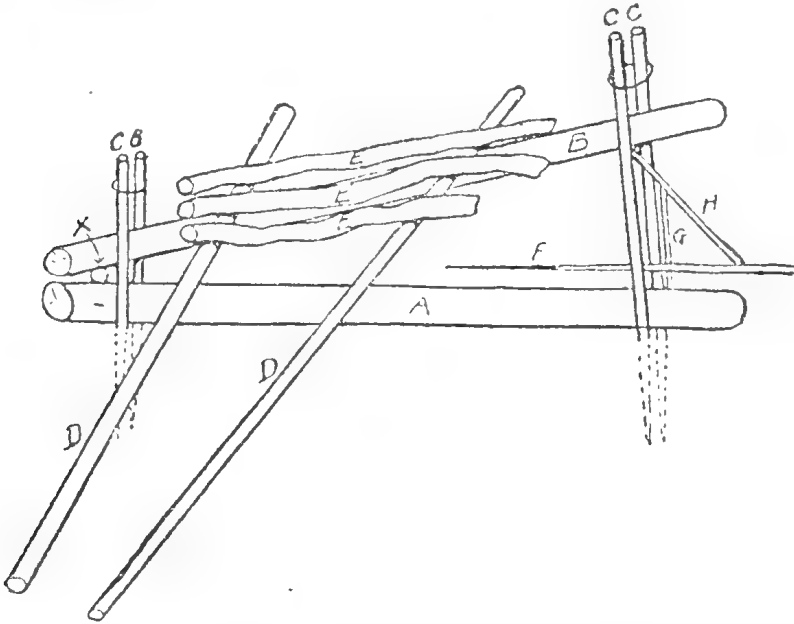
Mice are easily caught if one goes the *right* way about effecting their extermination. A cat is useful in this work, but she cannot eat more than her fill. A dog is too active to watch and wait like his feline companion. Traps want constant attention, and, moreover, they become recognised by the wiler members of these pestiferous vermin. Poison is dangerous; besides which, mice destroyed in this way often die in the runs, and so give rise to offensive odours. Bottles will catch mice alive or dead, as may be required. These bottles should be vessels with fairly open mouths, and not too-long necks, and, when in position, should be placed at an angle, as in the accompanying diagram, with means of approach.



If something is inserted as a bait, with a scent sufficient to attract the attention of the little animals, they will soon investigate the inner recesses of the bottle, and, once there, their exit is more than they can effect themselves. The glass affords no foothold, and although they may spring as far as the bottle neck, down they slide, to repeat the effort until exhaustion compels them to desist. If a poisoned bait is put into the bottle, the traps should be constantly visited, and the bodies of the victims emptied out. Barns, corn-lofts, stacks, and other places about the farm can be cleared pretty effectually of rats and mice by this means; only in the case of rats the bait should always be poisoned.

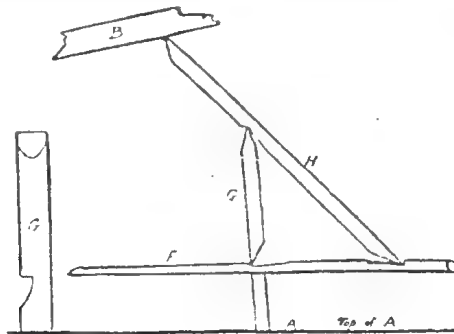
The Russian Wolf-trap.

A trap which is commonly used in Russia for catching wolves and foxes is very simple in its construction, as will be seen by the accompanying illustration, and effective in its work.



To construct it firmly lay on the ground the bedpiece marked A. Then proceed to place the four stakes, which must be pointed to drive into the ground, to keep the fallpiece marked B in position. Lay B on A with a piece of timber the size of the wrist, as shown at X (Fig. 1). Then secure the tops of the stakes CCCC with either rope or wire which has no smell about it. Now lay on the two bearers DD to hold the loading marked EEE. Provide this loading, and you are prepared to set the trap.

The trigger is the next consideration. It is simple and easy to construct with a pocket knife out of a branch the thickness of a whipstick and with the bark left on to make it less conspicuous. FGH is the trigger in three pieces. Determine the intended height of the trap between A and B at the position of the trigger-post G, and let it (the post) be three-quarters of the height. Let H be the strongest piece, as it has to bear the weight of the loading. The piece F is the slightest,



TRIGGER.

with the stouter end to the right hand of the trap, as shown in Fig. 1. In preparing the trigger see sketch No. 2 enlarged, and mate the pieces in proportion, as shown in Sketch No. 1, and it will be evident that the slightest pressure on F is sufficient to disengage it at the catch I, when the B with its loading collapse on to the intruder—wolf, dingoo, wallaby, or fox.

Sometimes the traps may be neglected for a time, and dead vermin allowed to lie in them till they decompose. In this case, do not reset the traps immediately, but put a prop under the fallpiece to keep it up, and bury the trigger pieces for a week to sweeten them, so that the vermin may accustom themselves to the track again.

In placing the trap in position, it should be arranged so that the part F on the trigger comes in the centre of the track or hole in any fence, and the load-bearers DD should be so arranged as not to come in contact with any obstruction when they fall on the vermin, or the latter may effect their escape.

The loading may be made as heavy as circumstances seem to require.

If logs are scarce in some parts of our plain country, a flat-shaped boulder may be fixed up to give weight. The trigger, or acting portion of the trap, is on the principle of the old-fashioned figure-of-four trap which was used for trapping mice and birds in gardens; and keep them down they did, for a large flat stone was used for the purpose. This Russian trap is well worth a trial in Queensland where dingoes are numerous, as it costs nothing but the slight labour needed for its construction.

The Dingo Pest.

Mr. Howard Skinner, Beardie Lagoon, Dirranbandi, in a letter written to the Department of Agriculture and Stock, asks for information concerning any reliable decoy that will induce dingoes to enter traps. The matter was referred to Mr. E. M. Land, M.L.A., who, in reply, said that several methods for the destruction of dingoes are employed, the principal of which are:—

- (a) Poison baits;
- (b) Traps;
- (c) Hunting dogs, such as wolf and stag hounds;
- (d) Skilled men who know the habits and haunts of the dogs.

Poison baits account for the destruction of the great majority of dogs, and the process adopted for making baits is to secure about an ounce of meat, raw or cooked, great care being exercised that the naked hand does not touch the meat. A slit is made, and as much strychnine as would cover a three-penny bit inserted. A man could make hundreds of these baits in a day. They would then be distributed in likely places. A roasted leg of mutton dragged along, and baits dropped on the trail, have accounted for fourteen dogs on one line of baits in a couple of days, and, at the same time, numbers have died in the bulga scrub. Traps are useful if a path along which the dogs run is known. Care must be taken in handling the traps; otherwise the scent from the hands would be noticed by the dog. The trap should be operated so that the plate on which the lure is laid would be flush with the surface.

ANSWERS TO CORRESPONDENTS.

Airedale Terriers.

By the courtesy of Mr. J. Bain, Secretary of the Royal National Agricultural and Industrial Association of Queensland, we have obtained the addresses of the following reliable breeders of Airedale Terriers:—

J. Flynn, Surrey street, Red Hill, Brisbane.

R. Smith, Barooka road, Rosalie.

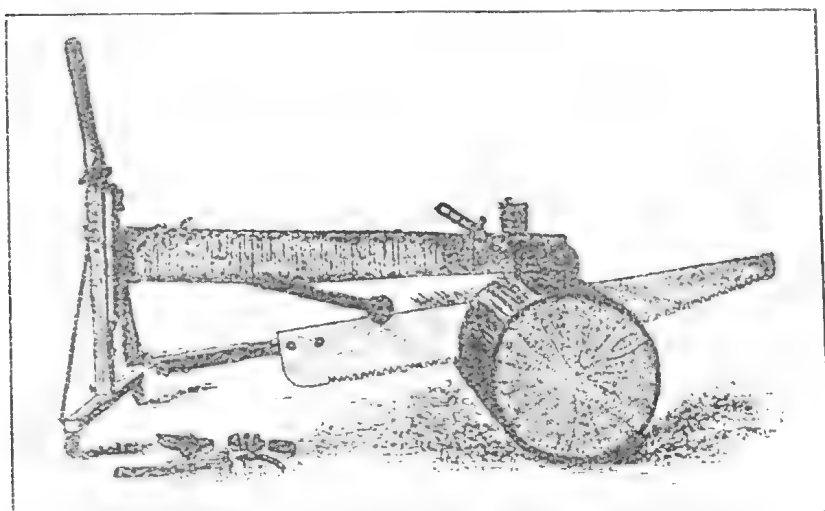
A. Ovenden, Tribune street, South Brisbane.

Re a Folding Saw.

RICHARD S. HEEPE (Buderim Mountain).—

We regret that, so far, we have no information concerning the folding saw illustrated in this Journal in November, 1899. At that time Messrs. James McEwan and Co., Elizabeth street, Melbourne, were makers and agents for the machine. Herewith we furnish the only illustration of it we have seen. It was claimed that any man accustomed to the machine can take it from his shoulder, unfold it, arrange it for sawing down a tree, change it back for sawing off a log, and change it again for sawing on a hillside. It was warranted to stand steady and work on any ground where two men can stand to run a crosscut saw, and to saw any kind of timber from 1 inch to 5½ feet in diameter. No matter how rough the ground may be, or at what angle the log may lie—say, at an angle of 45 deg. one way, and the ground where the machine is to be set the same degree (45) the other way—the machine can be adjusted instantly to suit the ground, log,

and direction desired to saw, without a moment's time being lost in setting the machine. Only one man is needed to run it. We may state that we obtained our information from the "Town and Country Journal."



REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, MAY, 1922.

The weather during the month was very unfavourable for egg production, owing to the cold westerly winds. There were odd cases of broodiness amongst the heavy breeds, also a good many birds moulting, including four in one pen. There were a few cases of sickness and four deaths. These birds have been replaced. Green feed is very scarce, otherwise the feeding of the birds is all that can be desired. The following are the individual records:—

Competitors.	Breed.	May.	Total.
LIGHT BREEDS.			
*W. and G. W. Hindes	White Leghorns	89	296
*Bathurst Poultry Farm	Do.	82	280
*N. A. Singer	Do.	93	263
C. H. Singer	Do.	76	245
J. H. Jones	Do.	38	237
*Geo. Trapp	Do.	36	234
A. G. C. Wenck	Do.	59	234
*W. A. Wilson	Do.	58	226
*T. Fanning	Do.	78	223
*W. Becker	Do.	80	218
*Mrs. L. Andersen	Do.	67	216
*S. L. Grenier	Do.	38	213
J. Purnell	Do.	45	210
B. Hawkins	Do.	23	206
*O. Goos	Do.	44	205
*G. Williams	Do.	41	201
*H. Fraser	Do.	46	195
*J. W. Newton	Do.	52	194
*H. P. Clarke	Do.	50	189
*J. M. Manson	Do.	79	189

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	May.	Total.
LIGHT BREEDS— <i>continued.</i>			
*Mrs. E. White	White Leghorns ...	38	185
*R. Gill	Do.	70	179
E. Stephenson	Do.	33	179
A. Maslin	Do.	22	179
T. H. Craig	Do.	37	177
*R. C. Cole	Do.	45	176
*C. Goos	Do.	57	174
B. C. Bartlem	Do.	14	164
G. H. Richardson	Do.	36	162
N. J. Nairn	Do.	26	147
*E. A. Smith	Do.	59	147
*Oakleigh Poultry Farm	Do.	37	145
*F. Birchall	Do.	42	142
*J. W. Short	Do.	42	141
*C. M. Pickering	Do.	31	140
A. Anders	Do.	15	140
*M. F. Newberry	Do.	47	138
*Mrs. R. Hodge	Do.	55	135
E. Seymour	Do.	38	134
*Thos. Taylor	Do.	55	133
*R. C. J. Turner	Do.	28	126
Brampton Poultry Farm	Do.	5	99
H. Trappett	Brown Leghorn ...	4	72
Parisian Poultry Farm	Do.	1	11

HEAVY BREEDS.

*A. E. Walters	Black Orpingtons ...	67	280
Wombo Poultry Farm	Do.	42	265
Mrs. A. Kent	Do.	25	249
*R. Holmes	Do.	46	232
*H. M. Chaille	Do.	76	231
*R. Burns	Do.	52	225
J. Hutton	Do.	47	225
*T. Hindley	Do.	94	216
*Rev. A. McAllister	Do.	28	191
*E. F. Dennis	Do.	82	191
Mrs. A. E. Gallagher	Do.	57	174
Mrs. L. Maund	Do.	35	153
*Jas. Potter	Do.	34	147
*C. C. Dennis	Do.	92	143
Jas. Hitchcock	Do.	15	135
V. J. Rye	Do.	21	130
R. Innes	Do.	21	128
C. Rosenthal	Do.	31	127
A. Rosenthal	Do.	34	127
C. Doan	Do.	39	117
H. B. Stephens	Do.	40	116
W. C. Trapp	Do.	27	74
W. Becker	Chinese Langshans ...	40	69
*Parisian Poultry Farm	Black Orpingtons ...	20	69
*J. E. Smith	Plymouth Rocks ...	13	24
R. Burns	Silver-laced Wyandottes	2	21
*Miss L. Hart	Rhode Island Reds ...	0	1
Total ... ..	...	3,063	11,836

* Indicates that the pen is being tested singly.

DETAILS OF SINGLE PEN TESTS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
W. and G. W. Hindes	64	38	56	48	55	35	296
Bathurst Poultry Farm	40	31	52	54	66	37	280
N. A. Singer	33	52	41	45	40	52	263
G. Trapp	48	25	40	46	39	36	234
W. A. Wilson	32	30	29	51	37	47	226
T. Fanning	18	57	37	43	59	9	223
W. Becker	35	17	53	30	31	52	218
Mrs. L. Andersen	49	20	40	39	31	37	216
S. L. Grenier	35	16	42	40	39	41	213
O. Goos	34	23	35	50	38	25	205
G. Williams	29	38	39	32	29	34	201
H. Fraser	34	44	31	33	22	31	195
J. W. Newton	50	45	33	17	35	14	194
H. P. Clarke	36	18	32	36	37	30	189
J. M. Manson	37	20	37	12	48	35	189
Mrs. E. White	39	11	28	28	42	37	185
R. Gill	35	35	40	22	14	33	179
R. C. Cole	35	38	44	5	29	25	176
C. Goos	19	21	17	32	45	40	174
E. A. Smith	39	16	38	29	9	16	147
Oakleigh Poultry Farm	32	13	24	30	11	35	145
F. Birchall	24	24	7	28	31	28	142
J. W. Short	28	25	29	24	6	29	141
C. M. Pickering	36	35	12	20	22	15	140
M. F. Newberry	23	3	21	51	12	28	138
Mrs. R. Hodge	45	0	18	21	31	20	135
Thos. Taylor	34	8	31	25	24	11	133
R. C. J. Turner	22	14	30	29	24	7	126

HEAVY BREEDS.

A. E. Walters	42	43	59	36	49	51	280
R. Holmes	27	54	35	37	36	43	232
R. Burns	31	46	23	45	39	41	225
H. M. Chaille	56	35	44	42	37	17	231
T. Hindley	23	42	6	65	67	13	216
Rev. A. McAllister	34	40	55	19	9	37	194
E. F. Dennis	40	27	50	2	28	44	191
J. Potter	17	24	42	23	31	10	147
C. C. Dennis	26	35	32	11	27	12	143
Parisian Poultry Farm	2	11	27	6	12	11	69
J. E. Smith	0	2	7	0	11	4	24
Miss L. Hart	0	0	1	0	0	0	1

CUTHBERT POTTS,
Principal.

CERTIFICATES OF SOUNDNESS.

Certificates of Soundness were issued for the following Stallions during the month of June, 1922:—

Name of Stallion.	Breed.	Period for which Certificate was issued.	Owner's Name.	Owner's Address.
Sir William ..	Draught	Life ..	W. Holland ..	Braemar, Bundaberg
Patalster ..	Blood	Life ..	W. R. Bowman	Solicitor, Brisbane
Attaboy ..	Pony	Life ..	J. Healy ..	Maryborough street, Bundaberg
Don Car ..	Trotter	Life ..	G. Higgs ..	Toogoolawah
Tinta ..	Coacher	12 months	J. Leiper ..	Avondale

Farm and Garden Notes for August.

Land which has been lying fallow in readiness for early spring sowing should now be receiving its final cultivation prior to seeding operations. Potato-planting will be in full swing this month, and in connection with this crop the prevention of fungoid diseases calls for special attention. Seed potatoes, if possible, should be selected from localities which are free from disease; they should be well sprouted, and, if possible, should not exceed 2 oz. in weight. Seed potatoes of this size are more economical to use than those large enough to necessitate cutting. If, however, none but large-sized seed are procurable, the tubers should be cut so that at least two well developed eyes are left. The cut surfaces require to be well dusted with slacked lime, or wood ashes, as soon as possible after cutting. Where it is necessary to take action to prevent possible infection by fungoid disease, the dipping of potatoes in a solution of 1 pint of 40 per cent. formalin to 15 gallons of water, and immersing for one hour, will be found effective. Bags intended for the subsequent conveyance of tubers to the paddock should also be treated and thoroughly dried. After dipping, spread out the potatoes and thoroughly dry them before re-bagging. Where the tubers are cut, the dipping is, of course, carried out prior to cutting.

Arrowroot, yams, ginger, and sugar-cane may be planted this month in localities where all danger from frosts is over.

Maize may be sown as a catch crop, providing, of course, that sufficient soil moisture is available.

Sweet-potato cuttings may also be planted out towards the end of the month.

Weeds will now begin to assert themselves with the advent of warmer weather; consequently cultivators and harrows should be kept going to keep down weed growths in growing crops and on land lying fallow, as well as on that in course of preparation for such crops as sorghums, millets, or panicums, maize, and summer-growing crops generally.

Tobacco seed may be sown on previously burnt and well prepared seed-beds.

Kitchen Garden.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown which will keep the market gardeners busy for some time: Carrots, parsnip, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohlrabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie in the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top dressing, where vegetables have been planted out, with fine stable manure has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

Flower Garden.—All the roses should have been pruned some time ago, but do not forget to look over them occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragon), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupinus; and plant gladiolus, tuberoses, amaryllis, paneratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm, moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall 2.63 in., and for September 2.07 in., increasing gradually to a rainfall of 7.69 in., in February.

Orchard Notes for August.

THE COAST DISTRICTS.

The remarks that have appeared in these notes during the last few months respecting the handling and marketing of citrus fruits apply equally to the present month. The bulk of the fruit, with the exception of the latest ripening varieties in the latest districts, is now fully ripe, and should be marketed as soon as possible, so that the orchards can be got into thorough order for the Spring growth. All heavy pruning should be completed previous to the rise in the sap; and where Winter spraying is required, and has not yet been carried out, no time should be lost in giving the trunks, main branches, and inside of the trees generally a thorough dressing with lime and sulphur wash.

Where citrus trees are showing signs of failing, such as large quantities of dead or badly diseased wood in the head of the tree, they can (provided the root system is healthy) be renovated by cutting back the entire top of the tree till nothing but sound healthy wood is left. This should be thinned out, only sufficient main limbs being left from which to form a well-balanced tree, and the trunk and limbs so left should receive a dressing of lime sulphur, or Bordeaux paste.

Healthy trees that are only producing inferior fruit should be treated in a similar manner, and be either grafted with an approved variety direct or be allowed to throw out new growth, which can be budded in due course. The latter method is to be preferred, and an inferior and unprofitable tree can thus be converted in the course of a couple of years into a profitable tree, producing good fruit.

Where orchards have not already been so treated, they should now be ploughed so as to break up the crust that has been formed on the surface during the gathering of the crop, and to bury all weeds and trash. When ploughed, do not let the soil remain in a rough, lumpy condition, but get it into a fine tilth, so that it is in a good condition to retain moisture for the tree's use during Spring. This is a very important matter, as Spring is our most trying time, and the failure to conserve moisture then means a failure in the fruit crop, to a greater or lesser extent.

Do not be afraid if you cut a number of surface roots when ploughing the orchard, but see that you do cut them, not tear them. Use a disc plough and keep the discs sharp, and the root-pruning the trees will thus receive will do more good than harm, as it will tend to get rid of purely surface roots.

Planting of all kinds of fruit trees can be continued, though the earlier in the month it is completed the better, as it is somewhat late in the season for this work. The preparation of land intended to be planted with pineapples or bananas should be attended to, and I can only reiterate the advice given on many occasions—viz., to spare no expense in preparing the land properly for these crops—as the returns that will be obtained when they come into bearing will handsomely repay the extra initial expense. Growers of pineapples and bananas who send their fruit to the Southern markets should take more care in the grading and packing of such fruit, as their neglect to place it on the market properly means a big difference in price, and entails a loss that could be avoided had the necessary care and attention been given. The same remarks apply to the marketing of citrus fruits, pawpaws, custard apples, strawberries, cucumbers, and tomatoes, all of which are in season during the month.

The pruning of all grape vines should be completed, and new plantings can be made towards the end of the month. Obtain well-matured, healthy cuttings, and plant them in well and deeply worked land, leaving the top bud level with the surface of the ground, instead of leaving 6 or 7 in. of the cutting out of the ground to dry out, as is often done. You only want one strong shoot from your cutting, and from this one shoot you can make any shaped vine required. Just as the buds of the vine begin to swell, but before they burst, all varieties should be dressed with sulphuric acid solution, composed of three-quarters of a pint of commercial sulphuric acid to one gallon of water; or, if preferred, this mixture can be used instead—viz., dissolve 5 lb. of sulphate of iron (pure copperas) in one gallon of water, and when dissolved add to it half a pint of sulphuric acid. This is the winter treatment for the prevention of anthracnose or black spot, and for downy mildew, and should on no account be neglected.

Fruit-fly will make its appearance during the month, and citrus and other fruits are likely to be attacked. Every grower should, therefore, do his best to destroy as many flies as possible, both mature insects and larvæ, the former by trapping or otherwise, and the latter by gathering and destroying all infested fruit. If this work is carried out properly, a large number of flies that would otherwise breed out will be destroyed, and the rapid increase of the pest be materially lessened. The destruction of fruit-flies early in the season is the surest way of checking this serious pest.

Keep a careful lookout for orange-sucking bugs, and destroy every mature or immature insect or egg that is seen. If this work is done thoroughly by all citrus growers there will be far fewer bugs to deal with later on, and the damage caused by this pest will be materially reduced. Destroy all elephant beetles seen on young citrus trees, and see that the stems and main forks of the trees are painted with a strong solution of lime sulphur.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The pruning of all deciduous trees should be finished during the month, and all such trees should be given their annual winter spraying with lime sulphur. The planting of new orchards should, if possible, be completed, as it is not advisable to delay. Later planting can be done in the Granite Belt, but even there earlier planting is to be preferred.

Peach trees, the tops of which have outlived their usefulness and of which the roots are still sound, should be cut hard back so as to produce a new top which will yield a good crop of good fruit the following season in from fifteen to eighteen months, according to the variety.

Apple, pear, or plum trees that it is desirable to work over with more suitable varieties should also be cut hard back and grafted. All almond, peach, nectarine, and Japanese plum trees should be carefully examined for black peach aphid, as, if the insects which have survived the Winter are systematically destroyed, the damage that usually takes place from the ravages of this pest later on will be materially lessened.

Woolly aphid should also be systematically fought wherever present. The best all-round remedy for these two pests is spraying with black leaf 40.

In the warmer parts of these districts the pruning of grape vines should be completed, and they should receive their Winter dressing for black spot and downy mildew, as recommended for the Coast. In the Granite Belt the pruning of vines should, however, be delayed to as late in the season as possible, so as to keep the growth back and thus endeavour to escape late Spring pests.

Where orchards and vineyards have been pruned and sprayed, the land should be ploughed and brought into a state of as nearly perfect tilth as possible, so as to retain the moisture necessary for the proper development of the trees or vines and the setting of their fruit.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.**AT WARWICK.**

1922.	JULY.		AUGUST.		SEPTEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6.45	5.6	6.36	5.20	6.7	5.37
2	6.45	5.6	6.35	5.21	6.6	5.38
3	6.45	5.7	6.35	5.21	6.5	5.38
4	6.45	5.7	6.34	5.22	6.4	5.38
5	6.45	5.8	6.33	5.23	6.3	5.39
6	6.45	5.8	6.32	5.24	6.2	5.39
7	6.45	5.9	6.31	5.24	6.1	5.40
8	6.45	5.9	6.30	5.25	6.0	5.40
9	6.44	5.10	6.29	5.26	5.58	5.41
10	6.44	5.10	6.28	5.27	5.57	5.41
11	6.44	5.10	6.28	5.28	5.56	5.42
12	6.44	5.11	6.27	5.28	5.55	5.42
13	6.43	5.11	6.26	5.29	5.53	5.43
14	6.43	5.12	6.25	5.29	5.52	5.44
15	6.43	5.12	6.24	5.30	5.51	5.45
16	6.42	5.13	6.23	5.30	5.50	5.45
17	6.42	5.13	6.22	5.31	5.49	5.46
18	6.42	5.14	6.21	5.31	5.48	5.46
19	6.41	5.14	6.21	5.32	5.47	5.46
20	6.41	5.15	6.20	5.32	5.46	5.46
21	6.41	5.15	6.19	5.32	5.44	5.46
22	6.40	5.16	6.18	5.33	5.43	5.47
23	6.40	5.16	6.17	5.33	5.42	5.47
24	6.39	5.17	6.16	5.34	5.41	5.47
25	6.39	5.17	6.15	5.34	5.40	5.48
26	6.38	5.18	6.14	5.35	5.39	5.48
27	6.38	5.18	6.13	5.35	5.38	5.49
28	6.37	5.19	6.12	5.36	5.37	5.49
29	6.37	5.19	6.11	5.36	5.36	5.50
30	6.36	5.20	6.10	5.37	5.35	5.50
31	6.36	5.20	6.9	5.37	...	...

PHASES OF THE MOON, OCCULTATIONS, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer Time" is not used.

		H. M.
2 July	(First Quarter	8 52 a.m.
9 "	○ Full Moon	1 7 p.m.
17 "	☾ Last Quarter	3 11 p.m.
24 "	☾ New Moon	10 47 p.m.
31 "	(First Quarter	2 22 p.m.

Apogee on the 15th at 3.24 a.m.

Perigee on the 27th at 1.30 a.m.

About 8 o'clock in the evening of 29th July the apparent nearness of the Moon and the giant planet Jupiter low down in the west will form a very interesting spectacle; there will be an occultation of Jupiter about 9 o'clock.

8 Aug.	○ Full Moon	2 19 a.m.
16 "	☾ Last Quarter	6 46 a.m.
23 "	☾ New Moon	6 34 a.m.
29 "	(First Quarter	9 55 p.m.

Apogee on the 11th at 6.54 p.m.

Perigee on the 24th at 5.42 a.m.

During the evenings of 14th, 15th, and 16th August the planets Venus and Saturn will, with Eta Virginis, a second magnitude star, form an interesting group in the north-west.

6 Sept.	○ Full Moon	5 47 p.m.
14 "	☾ Last Quarter	8 20 p.m.
21 "	☾ New Moon	2 38 p.m.
28 "	(First Quarter	8 40 a.m.

Apogee on the 8th at 4.12 a.m.

Perigee on the 21st at 3.36 p.m.

About 3 o'clock on the afternoon of 30th September a pair of binoculars should afford a view of the Moon and a third magnitude star—Beta Capricorni. In the course of an hour the star may be seen in a small telescope to disappear suddenly on the eastern side of the Moon and reappear on its western side.

The planet Venus will be at its greatest height in the western sky on 15th and 16th September.

The Great Australian Solar Eclipse will occur on 21st September between a few minutes after 3 p.m. to about a quarter past 5.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter, the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XVIII.

AUGUST, 1922.

PART 2.

ORGANISATION OF THE AGRICULTURAL INDUSTRY.

Activities of the Provisional Council of Agriculture.

A Record of Progress and Achievement.

The Fourth Meeting of the Provisional Council of Agriculture was held on 20th July, and a complete record of its Proceedings is set out hereunder.

I.

The fourth meeting of the Provisional Council of Agriculture was held on 20th July, 1922.

Since the previous meeting of the Provisional Council, the Administrative Standing Committee had met twice—namely, on 28th June and 12th July; the Dairying Standing Committee had met on 13th and 14th July, and the Fruit Standing Committee had met on 12th July. The Transport Standing Committee held its first meeting on 13th July, when Mr. J. W. Davidson (Commissioner for Railways) was appointed Chairman.

The Administrative Committee reported that, under authority of a resolution passed at the last Council meeting, the Committee had taken the necessary steps to appoint Provisional Organisers, as follows:—

No. of District.	Electoral Divisions Comprised.	Name of Organiser.
1	Cairns, Chillagoe, Cook, Eacham, Herbert	Mr. Harvey Jurd
2 and 3	Bowen, Kennedy, Mundingburra, Townsville, Charters Towers, Queenton	Mr. D. V. Hannay
5 and 6	Fitzroy, Mt. Morgan, Normanby, Keppell, Port Curtis, Rockhampton	Mr. T. Ritchie
7	Bundaberg, Burnett, Musgrave	Mr. R. J. Webster
8	Burrum, Gympie, Maryborough, Nanango	Mr. T. J. O'Connell
9	Cooroora, Wide Bay	Mr. A. S. Douglas
10A	Aubigny, Ipswich, Lockyer, Bremer ..	Mr. J. S. Mickan
10B	Cunningham	Mr. J. McMaster
11	Bulimba, Logan, Murrumba, Nundah, Oxley, Stanley (also <i>pro forma</i> Metropolitan Constituencies)	Mr. J. F. Dowd
12	Albert, Fassifern, Rosewood	Mr. R. Wight
13A	Pittsworth, Toowoomba, Toowoomba East	Mr. W. T. Harris
13B	Drayton	Mr. W. Gargett
14	Carnarvon, Warwick	Mr. W. Ranger
15	Dalby, Maranoa, Murilla	Mr. H. McAnally

The Council passed the following resolutions:—

Provisional Organisers—

- (1.) That the action taken by the Administrative Committee in this matter be confirmed.
- (2.) That in view of the fact that District No. 4 (Mackay and Mirani) is already well organised from the producers' viewpoint, the canegrowers' representatives on each of the Local Cane Prices Boards be asked to convene meetings for the purpose of forming Local Producers' Associations, subsequently appointing delegates to the District Council.
- (3.) That in respect to canegrowers in other districts, arrangements similar to those indicated in (2.) above be made, as far as practicable, thus enabling the provisional organisers to concentrate more fully on the primary industries still to be organised.
- (4.) That the purport of (3.) above be suitably communicated to the Provisional Organisers; and that they be asked to act in accordance with the spirit thereof.

Council Delegates—

- (5.) That, as the provisional organisers have now been appointed, and it will no longer be necessary for the Council to avail itself of the services of the Council delegates, they be cordially thanked for their services in visiting districts and making known the aims and objects of the scheme for the organisation of the agricultural industry.

Chief Dairy Expert—Membership, Provisional Council—

- (6.) That it is noted that the Dairy Committee strongly urges the appointment of Mr. E. Graham, Chief Dairy Expert, as a member of the Provisional Council of Agriculture and of the Dairying Standing Committee, in view of—
 - (a) His expert knowledge of the problems connected with all phases of the dairying industry;
 - (b) The advantage to the dairying community of having him closely associated with the business transactions of the Council.
- (7.) That in view of the above circumstances it be a recommendation to the Government to appoint Mr. Graham as a member of the Provisional Council.
- (8.) That it is noted that, following upon the Conference with the Premier on the 15th June, 1922, the Dairying Industry Advisory Board was disbanded; that Messrs. Douglas, McAnally, and Sloan had retired from the Council; and that Messrs. J. E. Dean, H. Keefer, W. Purell, and T. Plunkett (formerly members of the Dairying Industry Advisory Board) were appointed as dairy representatives on the Provisional Council.

Personnel, Certain Committees—

- (9.)—
 - (a) That in view of the retirement from the Council of Mr. Douglas, Mr. McAnally, and Mr. Sloan, their names be removed from the list of members of the Standing Committees to which they were appointed.
 - (b) That it is noted that the personnel of the Dairy Committee is now as follows,—namely, Messrs. J. E. Dean, H. Keefer, J. Purell, W. Purell, T. Plunkett, and J. T. Tod, with Mr. E. Graham, Chief Dairy Expert, as associate member.
 - (c) That Mr. H. Keefer be appointed as a member of the Transport Committee, in the room of Mr. Douglas, retired.
 - (d) That Mr. T. Plunkett be appointed as a member of the Wheat and General Agriculture Committee, in the room of Mr. McAnally, retired.

Associate Members, Publicity Committee—

- (10.) That the Editor of the "Education Office Gazette" and the Editor of the "Queensland Government Mining Journal" be appointed as associate members of the Publicity Committee. (The Editor of the "Queensland Agricultural Journal" had been previously appointed a member of this Committee.)

Director, Queensland Producers' Association—

- (11) That, in the opinion of this Council, Mr. R. L. Macgregor is the most suitable candidate (from amongst the 72 applicants for the position) for appointment as Director of the Queensland Producers' Association.
- (12.) That it be reported to the Government that the Council unanimously recommends the appointment of Mr. R. L. Macgregor to the position in question, under the conditions outlined in the Primary Producers' Organisation Bill which is now before Parliament.

[Mr. Macgregor has telegraphed his acceptance of the position, and has been requested to take up duty as soon as possible.—Ed.]

II.

Activities of the Provisional Council in relation to Proposals for the benefit of producers.

1. *Income Tax Relief for Farmers—*

That in connection with a recommendation recently submitted by the Queensland Farmers' Alliance, to the effect that "any farmer whose farm is mortgaged and who is liable to pay more than £25 in interest per annum, and the unimproved value of whose property does not exceed £2,000, shall be allowed double the amount of interest payable as a deduction from Income Tax assessment," it is noted that advice has been received from the Under Secretary to the Treasury that in an amendment of the Land Tax Act which it is proposed to introduce during the current session of Parliament, certain relief will be given to farmers owning land.

2. *Herd-testing.*

- (a) That this Council, recognising the importance of the improvement of dairy herds by herd-testing, recommends that the services of officers of the Department of Agriculture and Stock be made available, to the fullest extent, to Associations formed for the purpose of furthering the principles of herd-testing;
- (b) That it be a recommendation that Mr. E. Graham, Chief Dairy Expert, be asked to prepare for submission to the next meeting of the Dairy Committee a concrete scheme to give effect to the foregoing recommendation;
- (c) That the Herd-testing Associations which conferred recently with the Dairy Committee be suitably advised to the foregoing effect.

3. *Factory returns required by the Department of Agriculture—*

That the Chief Dairy Expert be asked to give further consideration to the matter of returns supplied from factories relating to cream of low-grade quality.

4. *Dairy Inspectors—*

That the Council is of opinion that the present staff of dairy inspectors is not sufficiently large to cope with the volume of work entailed by the new Dairy Produce Act, and recommends that the Department of Agriculture be requested to appoint a number of additional inspectors.

5. *Cold Store at Hamilton—*

- (a) That the Minister for Works be urged to expedite the building of the cold stores, as the recent general rains make possible early and heavy production in the dairying industry, which will necessitate the provision of extensive storage.
- (b) That the four rooms which it is anticipated will be in readiness by December, should be utilised for the storage of dairy products. Fruit and other produce should be placed in the cold stores at Roma street.
- (c) That the Council is of opinion the control of cold stores at Hamilton should be vested in the Department of Agriculture and Stock.

6. *Minimum Load of Butter—*

That the Dairy Committee and the Transport Committee confer on the question of reducing the minimum truck load of butter from 3 to 2 tons.

7. *Question of Introduction of Co-operative Companies Bill—*

(a) That in view of arrangements already made by the Dairying Industry Advisory Board, representatives of co-operative companies be requested to meet the members of the Council in Conference on Friday, the 21st instant.

(b) That the Council be represented at the Conference by—

- (i.) The several members of the Dairy Committee;
- (ii.) Messrs. Ellison and Howe (fruit representatives);
- (iii.) Messrs. Batchelor, Powell, and Pritchard (sugar representatives).

8. *Plans of Dairy Buildings, &c.—*

That it be a recommendation to the Department of Agriculture to investigate and draw up plans and specifications (to be on the most economic and efficient basis) of dairy buildings, yards, pig-styes, sheds, milk stands, &c., with a view to making the plans available for distribution to dairy farmers; such buildings to comply with the provisions of the Dairy Produce Act.

9. *Conservation of Fodder—*

That the New South Wales Government be requested to furnish a copy of the scheme relating to the conservation of fodder, which it has now under consideration.

10. *Cream Containers—*

That the Co-operative Dairy Companies' Association be requested to investigate the matter of securing suitable rimless cream containers, with a view to recommending their adoption in place of kerosene tins at present widely in use.

11. *Director of Fruit Culture—*

(a) That the Council strongly recommends the appointment of a Chief Instructor of Fruit Culture to act as deputy to the Director, to perform a reasonable amount of field work and to assist in the adequate supervision of the field staff.

(b) That with a view to obtaining a suitable man the position be advertised throughout Australia.

12. *Citriculturist—*

That the Public Service Commissioner be requested to consult the Council of Agriculture when applications are being invited for this position.

13. *Visit of Tasmanian Government Fruit Expert—*

That as Mr. Ward, Tasmanian Government Fruit Expert, will be visiting Brisbane in August next, the Department of Agriculture be requested to endeavour to arrange for an extension of his visit to the Stanthorpe district and for a lecture by him on deciduous fruit growing.

14. *Banana Pool—*

(a) That the Department of Agriculture be requested to take a ballot of all banana growers in Queensland who have a minimum area of not less than 1 acre under bananas; and that the ballot papers contain the following questions:—

- (i.) Are you in favour of a Compulsory Banana Pool?
- (ii.) Would you approve of the Pool being conducted by the Southern Queensland Fruitgrowers' Society?

(b) That the growers be requested to return their ballot papers so as to reach the Department of Agriculture not later than the 31st August, and that they be asked to furnish at the same time—

- (i.) Name:
- (ii.) Address:
- (iii.) Number of acres under bananas:

15. *High Price of Fertilisers*—

That it is noted that the prices which are being charged to growers for manures are very high, and that the matter be brought suitably under the notice of the Prices Commissioner.

16. *Agricultural Machinery*—

That it be a recommendation to the Council that the several Standing Committees concerned list for discussion the matter of the high cost of agricultural machinery.

17. *Standards for Apples*—

- (a) That it is noted that the Stanthorpe District Council of Fruitgrowers has approved of following standards for apples:—

Grade A.—Apples to be well formed specimens of one variety, of uniform size, free from visible bitter pit, black spot, and hail marks, but case may contain not more than 10 per cent. of specimens with slight blemishes from insect and limb rub. Apples to be not less than 2½ inches in diameter.

Grade B.—Apples to be free from visible bitter pit, black spot, and hail marks, but case may contain not more than 20 per cent. of specimens with blemishes from insect and limb rub. Apples to be not less than 2½ inches in diameter.

Grade C.—Apples to be free from visible bitter pit and black spot, but case may contain 100 per cent. of specimens with insect, limb rub, and hail marks. Apples to be not less than 2 inches in diameter.

Grade D.—Apples to be free from visible bitter pit and black spot, but case may contain 100 per cent. of specimens with insect, limb rub, and hail mark. Apples to be not less than 1¾ inches in diameter.

Apples of Grades A, B, and C shall be properly packed according to the diagonal pack.

Apples of Grade D shall be so packed that the outer layer or shown surface shall be a true indication of the average grade of the fruit throughout the package.

The name of the variety and the size shall be marked on the outside of every case.

- (b) That it be a recommendation to the Department of Agriculture to take the necessary action to have these standards adopted.

18. *Rough Handling of Fruit*—

That it be a recommendation to the Department of Agriculture to introduce legislation to give effect to the following recommendations:—

- (a) No case or cases of fruit shall be stood or walked upon by any person except upon a plank of not less than 1 inch in thickness and 6 inches in width first placed on such case or cases for that purpose;
- (b) No person shall handle, stack, load, or unload any fruit whereby such fruit is subjected to shock sufficient, in the opinion of an inspector, to bruise or injure such fruit, whether such fruit be actually bruised or injured or not thereby.
- (c) Any person committing a breach of any regulations under "The [name of Act] Act" shall upon conviction be liable to a penalty not exceeding ten pounds.

19. *Diseases in Plants Act*—

That the following particulars be brought under the notice of the Department of Agriculture:—

- (a) The Council is satisfied that the Government has ample power under the Act to deal effectively with any disease, but considers that burying of fruit-fly-infested fruit is not a practically effective mode of destruction.
- (b) Section 5 of the Act, dealing with the appointment of inspectors, reads, "The Governor in Council may from time to time appoint such qualified persons as may be deemed necessary to be inspectors under this Act," &c. In the opinion of the Council the necessary qualifications should be laid down by regulations under this Act.

20. *Administration, Diseases in Plants Act—*

That it be a recommendation to the Department of Agriculture—

- (a) That regulations be issued defining the qualifications and duties of inspectors under this Act;
- (b) That no inspector be appointed in future until he has passed a practical examination in acknowledged methods of control of diseases and pests, and that he be certified accordingly;
- (c) That the Entomological Branch each month supply to the "Queensland Agricultural Journal" an article or current notes upon all particular diseases and pests which may require treatment, and the nature of that treatment during the ensuing month;
- (d) That inspectors have full powers to compel a grower to pick up and destroy all fallen fruit—at once if necessary;
- (e) That inspectors have full powers for carrying out an immediate prosecution; but to avoid victimisation, it is advisable when practicable to call in another inspector or competent officer as a witness;
- (f) That it is desirable that the Council of Agriculture should be consulted when appointments of inspectors are being made.
- (g) That the Stanthorpe district be divided into three areas, and one Diseases in Plants Act inspector be resident in and responsible for each area;
- (h) That a speedier mode of travelling be recommended. The use of motor cycles is desirable.

21. *"Bunchy Top" in Bananas—*

That in view of the particulars contained in a recent letter from the Secretary, Currumbin Fruitgrowers' Association, the Department of Agriculture be requested to cause immediate inquiries to be made into Mr. Marks's claim that he has discovered the cause and cure for "bunchy top" in bananas.

22. *Railway Trucks—Carriage of Fruit—*

That the following particulars be noted from the Progress Report of the Transport Committee:—

- (a) That there are now 496 louvered wagons in use in Queensland, that thirty more are under construction, and that all box wagons built in future will be of the louvered type.
- (b) That the New South Wales Railway Department also uses louvered wagons, but because of the colder climate in the New England district tarpaulins are used to cover the fruit in the leading ends of the wagons in winter time.
- (c) That a request will be made by the Railway Department of this State to the New South Wales authorities to extend the covering to the sides as well.

23. *Shipping Shed at Wallangarra—*

- (a) That it is noted from the report of the Transport Committee that the bulk of the fruit arrives at Wallangarra in train loads and is taken away in train loads, the Queensland wagons being placed opposite those of New South Wales. The building of a shed to cover the whole of the tranship road which would be necessary to avoid shunting would be very costly. The rainfall records at Wallangarra are not high.
- (b) That it is noted that the Commissioner for Railways will make inquiries regarding the supplying of collapsible covers to protect the fruit during the course of transhipment.

24. *Railway Checkers at Loading Centres—*

That it is noted from the report of the Transport Committee that, where the railway staff is available, clean receipts will be given for consignments. To provide checkers at every small station would necessitate increased charges, but senders' count receipts will be eliminated as far as possible.

25. *Conveyance of Fruit to Western Australia—*

- (a) That it is noted that the railway freight between Brisbane and Perth will be £10 11s. 6d. per ton plus inspection fees in 6-ton lots.

- (b) That it is also noted that the Commissioner for Railways will make further inquiry as to the time necessary for the conveyance of fruit where inspection charges will be levied in all the States.

26. *Delay—Consigning of Fruit to Adelaide—*

That it is noted that this matter is in the hands of the Victorian and South Australian railway authorities.

27. *Railway Rates for Fertilisers—*

- (a) That in connection with this matter the following circumstances have been noted:—Comparison of Queensland rates with those of New South Wales shows that up to 200 miles the comparison is favourable to Queensland, but over 200 miles the comparison is more in favour of New South Wales.

In the latter State there cannot be much traffic over long distances, so that the advantage in the rates would not be much availed of.

- (b) That it is also noted that the Transport Committee has agreed that the Chairman (the Commissioner for Railways) should recommend a reduction of 15 per cent. in the Queensland rates for distances over 200 miles, but not less than the present rate for 200 miles.
- (c) That the Transport Committee be asked to give further consideration to this matter at a later date, with a view to ascertaining whether a still further reduction may be possible in the direction indicated.

28. *Use of Refrigerated Trucks for Fly Infected Fruit—*

- (a) That in connection with a request from the Stanthorpe district for refrigerated cars for the conveyance of stone fruit from Stanthorpe to Brisbane, it is noted that the Transport Committee is of opinion that, if refrigerated wagons are provided, higher rates should be charged. Such wagons would be required in the height of the butter season and the Railway Department has no refrigerated wagons to spare during the heavy butter season. The Commissioner for Railways is prepared, however, to experiment with the use of a wagon during the coming season;

- (b) That it is also noted that this matter will receive further consideration by the Transport Committee.

29. *Entomological Work—*

That Messrs. Hives, Quodling, Ranger, and Short be appointed as the representatives of the Council on the Committee (consisting of representatives of the Department of Agriculture, the University of Queensland, and the Council of Agriculture) which it is proposed to form for the purpose of preparing a scheme for the possible correlation of the entomological work so far as these three bodies are concerned.

30. *Draft Bill—Compulsory Pools—*

- (a) That it is noted from a statement made by the President at this meeting that a draft Bill has been prepared;
- (b) That, in accordance with the President's suggestion, it be a recommendation to the Minister for Agriculture to cause each member of the Council to be furnished with a copy of the proposed Bill, on the understanding that the particulars will be regarded by members as confidential; and that an opportunity be afforded to the Council to consider the measure at its next meeting.

31. *Primary Producers' Organisation Bill—*

The Primary Producers' Organisation Bill was considered by the Council, and it was decided to suggest the following amendments:—

- (a) Definition of "Primary Producer" to be amended to read:—Every person engaged in the occupation of and any class of persons not being persons engaged in primary production as employees on wages or piecework rates.

- (b) *Quorum at Council Meetings—*

Clause (4) (7) to be amended, to read as follows:—"Subject to this Act a majority of members of the Council shall constitute a quorum at any meeting of the Council."

THE DIRECTOR, QUEENSLAND PRODUCERS' ASSOCIATION.

MR. R. L. MACGREGOR'S CAREER.

Mr. Richard Lewis Macgregor is a native of Scotland, and is 36 years of age. He was educated at the Glasgow High School and later at the Glasgow and West of Scotland Technical College. His early business training was acquired at an old-established Scottish county house, where he was trained in banking and law. This house managed the agricultural estates of the late Sir Donald Currie, and Mr. Macgregor was attached to that department and had opportunities of becoming familiar with the theory and practice of modern agriculture, including stock and crop marketing.

At the age of 23 Mr. Macgregor accepted the position of assistant manager of the Gaikhatas Estates, Bengal, India. This company controlled several large landed estates, and a large factory. Upwards of 5,000 people were connected directly or indirectly with the company, which undertook housing, water supply, roads, drainage, &c., in addition to works connected with cultivation and manufacturing. While in India Mr. Macgregor had full opportunity afforded him of mastering every detail of business organisation and the control of a large staff. Being desirous of coming to Australia, Mr. Macgregor, after completing his term of engagement with the Bengal company, declined an offer of extended service at increased remuneration, and came to Australia.

Arriving at Perth (Western Australia), he became secretary to Mr. J. Hawter, of Hawter's orchards and nurseries. He there acquired an intimate knowledge of every branch of fruitgrowing, including the growing of young trees—citrus and deciduous—as well as the growing of fruit for the export trade. He relinquished that position to take up wheatgrowing on his own account. At the time he was engaged in wheatgrowing, the agriculturists in the western State were passing through a succession of hard times. The Farmers' Co-operative Company had just been brought into being, and was operating in a very small way under the management of Mr. Stirling Taylor, who is now Director of the Bureau of Commerce and Industry. Mr. Macgregor formulated a scheme for the extension of the co-operative principle in the agricultural districts in the State, and, on outlining the scheme to Mr. Taylor, was invited by the latter to join him in the carrying out of the project. That success attended his organising efforts in this direction will be manifest when it is stated that the co-operative organisation in the western State now embraces the central wholesale house, the Westralian Farmers Limited, and some ninety odd local co-operative companies engaged in various kinds of co-operative undertakings. Starting eight years ago with a capital of £2,000, the Central company alone now has a capital and reserves amounting to approximately £100,000. When the scheme had been launched, Mr. Macgregor was invited by Mr. Taylor to undertake the management of three of the principal departments of the organisation. In the year 1917 the Farmers' Co-operative Company was successful in securing appointment as sole wheat-acquiring agents in the marketing of wheat for the Western Australian Government. Wheat had to be acquired at some 300 sidings, and large quantities had to be stored for long periods, the work entailing a large inside and outside staff. Owing to the magnitude of the undertaking, Mr. Macgregor was placed in control of that department and at the present time is manager of the wheat department. Mr. Macgregor is also the originator of the present scheme for the bulk handling of wheat in Western Australia, and, in addition to being manager of the wheat department of the Westralian Farmers Limited, is secretary to the Western Australian Grain Growers' Co-operative Elevators Ltd., the company which has been floated to carry out the scheme. He is entirely familiar with every aspect of that question.

In the year 1919 he was sent by the Farmers' Co-operative Company as sole representative to Europe to inquire into the marketing of agricultural products. Reports of his investigations were made available to the Commonwealth Government, and in that connection the Director of the Bureau of Commerce and Industry wrote him as follows:—

"I want to compliment you on both the wheat and fruit reports; the knowledge which you have gained will be invaluable to the whole industry, and should, when it becomes known, dissipate much of the doubt the companies have regarding the success of their own selling schemes."

While overseas, Mr. Macgregor took the opportunity of again familiarising himself with the methods and practices of the great English and Scottish Co-operative Wholesale Societies, and furnished reports to his principals dealing with these concerns.

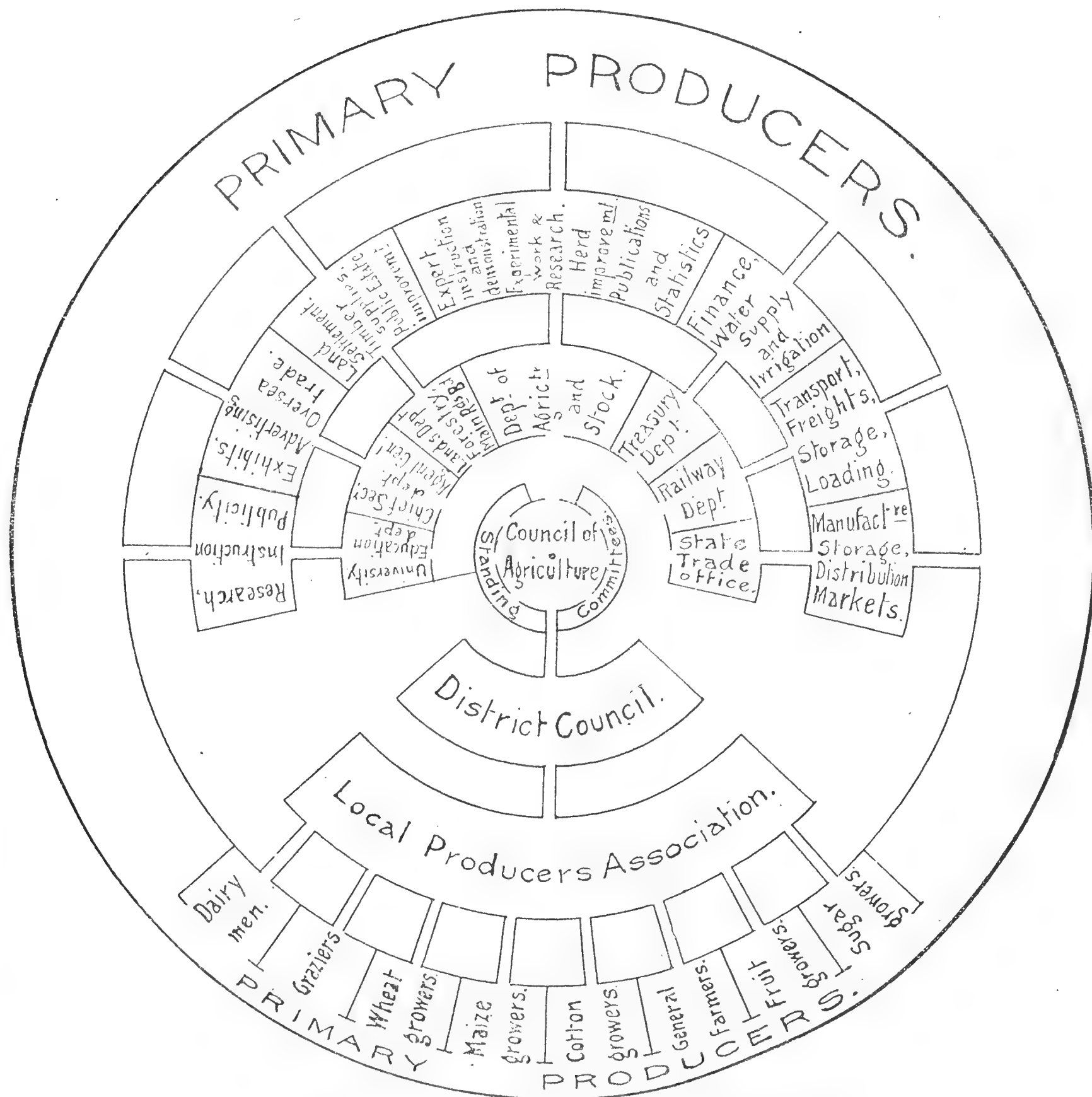


PLATE 8.—DIAGRAM SHOWING THE PROPOSED ORGANISATION OF QUEENSLAND PRODUCERS.

CASSAVA-GROWING AND MANUFACTURE.

In reply to a correspondent, who asks for some information concerning the cultivation of cassava and the method of extracting the farina, we republish notes on the subject which last year formed the subject of an article supplying whatever information we could obtain as to cultivation, and suggesting the use of the same machinery as that used by arrowroot-growers in preparing the arrowroot of commerce.

There are two varieties of the cassava (or, as it is known in Spanish America, manioc), viz., the sweet and the bitter, the latter bearing the botanical name of *M. utilisima*, the former *M. Aipi*. The more important is the bitter cassava, and this is the variety universally grown for the manufacture of tapioca. Its roots grow to a length of 2 feet, and weigh each about 8 lb. The average length is about 1½ feet. This root is yellow, and both root and stems contain a milky, powerfully poisonous juice. This poison, fortunately, is exceedingly volatile, so much so that if the sliced roots are exposed to the sun for a few hours the poison vanishes and the roots may then be safely fed to stock.

The sweet variety is distinguished from the bitter in that the roots are much smaller and of a reddish colour, and contain no poison whatever. They may be used to make tapioca, without any previous preparation. The return is, however, too small to make it worth while to grow this variety. Some years ago a sugar-planter in the North of Queensland planted a few acres of bitter cassava, but allowed it to die out owing to the want of a machine by which it could be treated.

We are informed that cuttings may be obtained by application to the Superintendent of the Yarrabah Mission Station, *via* Cairns, Queensland. The cuttings, if available, would be sent sealed at both ends, which will ensure their vitality on arrival at their destination. From the same source it may be that you could obtain information as to the necessary machinery.

It should be noted that the cassava plant thrives best on the coast land. There the roots yield a maximum of starch, whereas if grown further inland in dry areas the roots become more woody and poorer in yield of starch. Scrub land soil is to be preferred. In a damp soil the roots degenerate or rot away.

The machinery for extracting the farina is very similar to that used in the preparation of arrowroot, and is very simple. It can be supplied by any manufacturer of machinery in Queensland or in the other States of the Commonwealth.

A SUMMARY OF EXPERIMENTS CARRIED OUT BY THE BUREAU OF SUGAR EXPERIMENT STATIONS—III.

By H. T. EASTERBY, General Superintendent.

The first article of this series, in the course of which Mr. Easterby discussed deep cultivation experiments and tabulated comparative crop results from subsoiled and non-subsoiled fields, was published in the May "Journal." The second instalment was an account of the results of irrigation experiments and the action of irrigation and manures upon the density and purity of sugar juices, and appeared in the June issue. The third instalment treats of experiments in fertilisation.—Ed.

FERTILISER EXPERIMENTS.

A number of experiments with fertilisers have been carried out at the Sugar Experiment Stations. The first of these was to test the action of fertilisers upon crops cultivated in the ordinary way, and those receiving deep, thorough, and subsoil cultivation. The results of these are summarised hereunder:—

EXPERIMENTS WITH MIXED FERTILISERS.

MIXED MANURES OF NITROGEN, POTASH, PHOSPHORIC ACID.	ORDINARY CULTIVATION.		DEEP, THOROUGH, AND SUB- SOIL CULTIVATION.	
	Cane per acre, English tons.	Sugar per acre, English tons.	Cane per acre, English tons.	Sugar per acre English tons
1. Fertiliser	31.6	4.0	52.1	7.2
2. No fertiliser	28.6	3.8	48.0	6.6
Difference	3.0	0.2	4.1	.06

The results from the application of a mixed fertiliser in these examples are not very great. It is noted that the manure gave a higher increase of return in cane, and

more notably in sugar, upon the "deep cultivation" land than where "ordinary cultivation" was practised. During the first nine months of the life of the cane in these experiments the weather was extremely dry and rainless. The cane under ordinary cultivation ceased growing several months before the deeply cultivated cane did, which may account for the smaller use it made of the manure. Had rain been abundant, the fertiliser, with ordinary cultivation, would probably have given the highest results.

FERTILISER EXPERIMENTS WITH SINGLE ELEMENTS.

These experiments were carried out in order to try to determine the fertilising action of each of the individual chemical elements. The experiments were made in two series or in duplicate, and upon the "irrigated" and "non-irrigated" areas of cane. To economise space, the number of trials in each series are run together, and results given in average.

The results represent the actions respectively of nitrogen, potash, lime, and phosphoric acid, in comparison with results where no fertiliser was used:—

ACTION OF THE ELEMENTS ON NON-IRRIGATED CANE.

Fertilising Elements.						Weight of Cane per acre, in English tons.	Total Sugar per acre, in English tons.
1. Nitrogen	..	..	..	..	..	51.5	7.0
2. Potash	..	..	..	..	..	51.5	6.9
3. Lime	..	..	..	..	..	50.5	6.5
4. Phosphoric acid	..	..	..	..	..	48.9	6.7
5. No fertiliser	..	..	..	..	..	48.3	6.6

ACTION OF THE ELEMENTS ON IRRIGATED CANE.

Fertilising Elements.						Weight of Cane per acre, in English tons.	Total Sugar per acre, in English tons.
1. Nitrogen	..	..	..	..	..	48.9	6.7
2. Potash	..	..	..	..	..	49.5	6.7
3. Lime	..	..	..	..	..	46.7	6.1
4. Phosphoric acid	..	..	..	..	..	43.2	5.8
5. No fertiliser	..	..	..	..	..	40.5	5.9

The respective actions of the several elements are set forth in the above table. It is, in the first place, observed that the fertilising action throughout was notably greater in the series where irrigation water was applied than where the crop was grown by rainfall only. This result appears to confirm the observation made in connection with the "mixed fertiliser" results—viz., that, "had rain been abundant the fertiliser, apart from cultivation, would have given greater results." Nitrogen and potash not only give the highest results; they give practically identical returns in each of the two series—with and without irrigation. These results are strictly in agreement with the findings of the laboratory, the soil analyses having indicated that nitrogen and potash were the elements more emphatically in request.

The above experiments were made with plant crops only.

EXPERIMENTS WITH PLANT AND RATOON CROPS, 1906 TO 1909.

In the following tables are shown results from the use of mixed fertilisers in plant, first, second, and third ratoons upon irrigated and non-irrigated cane:—

Plots.	1906 PLANT CROP.			1907 1ST RATOON CROP.			1908 2ND RATOON CROP.			1909 3RD RATOON CROP.		
	Man-ures.	No Man-ures.	Differ-ence.	Man-ures.	No Man-ures.	Differ-ence.	Man-ures.	No Man-ures.	Differ-ence.	Man-ures.	No Man-ures.	Differ-ence.
Irrigated ..	58.4	54.1	4.3	41.9	32.6	9.3	39.5	24.0	15.5	35.1	19.6	15.5
Non-Irrigated ..	50.7	47.4	3.3	42.4	31.7	10.7	38.8	24.1	14.7	35.9	19.8	16.1

These mixed manures were composed of 150 lb. nitrate of soda, 150 lb. sulphate of ammonia, 100 lb. sulphate of potash, and 300 lb. of superphosphate, per acre.

The increase in the plant crop, when the land had been freshly subsoiled and had been limed and green manured, was only small. The action of the deep ploughing combined with the lime would cause a large amount of the chemical plant food elements to be brought into a soluble and available condition for the use of the crop. The difference, therefore, between manured and unmanured cane in the plant crop was not very striking. When we come to the ratoon crops the results of manure are at once apparent, and the yields for manure are highly satisfactory.

EXPERIMENTS WITH MIXED MANURES AND SINGLE ELEMENTS.

The following experiments were carried out from 1911 to 1913, and the results are summarised below:—

CROP RESULTS TO DATE: MANURIAL EXPERIMENTS—PLANT, FIRST RATOON, AND SECOND RATOON CROPS, 1911, 1912, AND 1913.										
Variety of Cane.	Manure Applied.	No. of Plot.	PLANT CROP, 1911.		FIRST RATOON CROP, 1912.		SECOND RATOON CROP, 1913		TOTAL YIELD OF THREE CROPS.	
			Yield of Cane per Acre, in English tons.	Yield of Sugar per Acre, in English tons.	Yield of Cane per Acre, in English tons.	Yield of Sugar per Acre, in English tons.	Yield of Cane per Acre, in English tons.	Yield of Sugar per Acre, in English tons.		
New Guinea 40..	Nitrate of soda ..	1	49.1	7.4	26.2	3.4	26.9	3.7	102.2	14.5
New Guinea 40..	Sulphate of ammonia	2	48.0	7.1	28.7	3.4	30.5	4.3	107.2	14.8
New Guinea 40..	Sulphate of potash..	3	47.4	6.8	24.9	3.4	24.2	3.4	96.5	13.6
New Guinea 40..	Mixed fertiliser ..	4	47.4	7.3	30.7	3.9	30.1	4.4	108.2	15.6
New Guinea 40..	No manure ..	5	42.0	6.5	18.6	2.7	18.1	2.8	78.8	12.0

The quantities applied per acre were as under—

Nitrate of soda	..	..	..	..	4 cwt.
Sulphate of ammonia	..	..	..	..	4 cwt.
Sulphate of potash	..	..	..	..	4 cwt.
Mixed fertiliser	..	..	..	..	4 cwt.

The mixed manure consisted of 172 lb. sulphate of ammonia, 69 lb. sulphate of potash, and 207 lb. of superphosphate. This was a very small dressing of mixed manure, but it gave the best result over the three crops.

The profit per acre for the mixed manure was considerably greater than for any other fertiliser used.

It has always been maintained that more payable results can be secured from the use of fertilisers containing the three elements—viz., nitrogen, potash, and phosphoric acid.

FERTILISER EXPERIMENTS WITH FIRST RATOONS OF D. 1135. AGE OF CANE,
13 MONTHS—BUNDABERG SUGAR EXPERIMENT STATION, 1914.

Plot No.	Manure applied.	Tons of Cane per Acre.	Tons of Total Sugar per Acre.	Tons of Pure Obtainable Cane Sugar per Acre.
1	Nitrate of soda, 4 cwt.	23·17	3·14	2·84
2	Sulphate of ammonia, 4 cwt. ..	24·56	3·45	3·16
3	Sulphate of potash, 4 cwt.	20·03	..	..
4	Meatworks, 6 cwt.	20·95	2·96	2·68
5	Mixed manure, 6 cwt. (nitrogen, potash, and phosphoric acid)	26·17	3·71	3·43
6	No manure	19·13	2·78	2·57

The above was one of the first experiments carried out with fertilisers on the Bundaberg Experiment Station, and was on a large scale. The fertilisers were applied to ratoons existing upon the station at the time of purchase. Due to the fact that the station was not taken over till the end of December, 1913, the fertilisers could not be applied till late in that month. This was followed by a comparatively dry period, and it was not till the following March that any real growing weather set in.

This had an adverse effect upon the manures generally, although the result of the mixed manures was, on the whole, satisfactory and in line with experience elsewhere.

Analyses of these canes were carried out by the nearest mill; but, due to an oversight, the cane from the sulphate of potash plot was not analysed, so that the sugar per acre cannot be given.

The following year mixed manure was applied to part of the second ratoons of the above crop, a part receiving no manure. The results were as follow:—

Treatment.	Yield of Cane per Acre, in English tons.	Yield of Commercial Cane Sugar per Acre, in English tons.
Mixed manure	29.75	3.82
No manure	22.17	2.94

Difference for manure—7.58 tons cane per acre.

At the Experiment Station, Bundaberg, excellent results were secured from the action of mixed fertilisers upon a first ratoon crop of standover D1135 in the year 1917, which was a very favourable season.

CROP RESULTS FROM EXPERIMENTS WITH AND WITHOUT MANURES—STANDOVER FIRST RATOON, D. 1135, 1917.

Plot No.	Treatment.	Age of Cane.	Weight per Acre, in English tons.	Yield of Commercial Cane Sugar per Acre, in English tons.
1	Mixed manure, consisting of sulphate of ammonia 1 cwt., nitrate of soda 1 cwt., sulphate of potash 1 cwt., and meat-works manure 1 cwt.	25 months	80.75	12.04
2	No manure	25 months	60.54	9.66

The difference made in the yield in the above experiment was 20.21 tons of cane and 2.38 tons of sugar per acre for the use of mixed manure. The total yield was very high, and goes to show how profitable standover crops of cane in the Bundaberg district can be when seasons such as 1917 are experienced.

Still better results were secured in the following year from the use of mixed fertilisers in the same proportions on the second ratoon crop.

CROP RESULTS FROM EXPERIMENTS WITH AND WITHOUT MANURES—D. 1135, SECOND RATOONS, 1918.

Plot No.	Treatment.	Age of Cane.	Weight of Cane per acre, in English tons.	Yield of Commercial Cane per acre, in English tons.
1	Mixed manure, consisting of sulphate of ammonia 1 cwt., nitrate of soda 1 cwt., sulphate of potash 1 cwt., and meat-works manure 1 cwt.	12 months	37.29	4.93
2	No manure	12 months	14.62	1.82

This shows a difference of 22.67 tons in favour of the manure.

The above experiment with fertilisers covered four crops—i.e., plant, first, second, and third ratoons. A summary of the results are included below.

CROP RESULTS TO DATE OF EXPERIMENTS WITH AND WITHOUT MIXED MANURES.

Plot No.	Variety of Cane.	Treatment.	Plant Crop, 1915.	First Ratoon Crop, 1917 (STANDOVER).	Second Ratoon Crop, 1918.	Third Ratoon Crop, 1919.	Average of Four Crops.
			Yield of Cane per Acre, in English tons.	Yield of Cane per Acre, in English tons.	Yield of Cane per Acre, in English tons.	Yield of Cane per Acre, in English tons.	Yield of Cane per Acre, in English tons.
1	D. 1135..	Mixed manure, consisting of sulphate of ammonia 1 cwt., nitrate of soda 1 cwt., meatworks manure 1 cwt., sulphate of potash 1 cwt. Subsoiling	21.90	30.75	37.29	16.13	39.02
2	D. 1135..	No manure	20.04	60.54	14.62	12.60	26.95
					1.82	1.90	4.00
					4.03	2.40	5.68

It will be seen from the above table that there was a net average increase of 12.07 tons of cane for the use of the mixed fertiliser, which paid exceedingly well.

(TO BE CONTINUED.)

SUGAR : FIELD REPORTS.

The Northern Field Assistant attached to the Bureau of Sugar Experiment Stations, Mr. E. H. Osborn, reports under date 6th July, 1922:—

“Herbert River.—A short visit was made to this district early in June. The weather conditions were then very dry, with fairly cold nights; in fact, a touch of frost was felt in the Stone River district one morning. The rainfall so far this year has been very unevenly distributed, as out of a total fall of 56.44 inches for Ingham and 62.01 for Halifax, nearly 70 per cent. fell in February and very small amounts since, and in consequence the cane generally has not made the growth that it should, and is “yellowing” in places. At the time of my visit a few good showers would have been of great benefit to the early planted cane (which, so far, looked very well), and also to help any cane along that showed signs of grubs. Although the latter are to be seen in isolated places, they do not seem to be any worse than last season.

“Borers were noticed in several places, and the absolute necessity for using only healthy cane when planting out cannot be impressed too strongly upon growers. It is gratifying to know that the C.S.R. Company at Macknade are now breeding Tachinid flies for liberation in borer-infested areas. Next year’s crop has probably been planted in the following order:—H.Q. 426, Badila, and H.Q. 409. The company are also distributing to growers plants from New Guinea varieties known as Corambo, Nanemo, and Korpi. Canes from the South Johnstone Station are also being extensively tried out, those most in favour being Tableland, Badila, E.K. 1, E.K. 28, and Q. 813. The last-named was noticed as having given excellent striking results in the company’s experimental plot at Macknade.

“Macknade started crushing on the 2nd instant, whilst Victoria hoped to commence about the 7th, and unless the weather keeps very dry or the grubs do much more damage than expected, the Herbert River district should certainly harvest a larger tonnage of cane than was put through in 1921. Plenty of labour was available for all work, and the company look forward to a fairly satisfactory season.

“Cairns District.—This district was reached on the 6th of June, and practically the same dry conditions as were prevailing on the Herbert were noticed here, except that although the Cairns rainfall was only 55.06 inches for the same period, it was better distributed than the Herbert River fall. Rain was, however, very badly needed, both for the very large area of young plant cane and also to keep the grubby cane going.

“Unfortunately, grubs have appeared over a wider and more scattered area than formerly. Several farmers generally affected have not suffered as much as in former years, whilst areas formerly free are now suffering to some extent.

“It is noticeable how much better D. 1135 stands up to grubs than either Badila or H.Q. 426, and in consequence the proportion of the former cane is on the increase. At Freshwater no signs of grubs, or, indeed, of any pest are to be seen, and the cane areas there present a healthy appearance, and some very fine cane is met with. The tram lines connecting the farm with Redlynch are now very nearly completed, and I understand that the cane haulage on the latter will be done by means of a couple of motor engines.

“With the present outlook it seems that probably 55,000 to 60,000 tons of cane will be railed to Hambleton from this centre. Great progress is being made in this particular part of the Cairns district. New homes are to be seen in every direction, and when the season starts, the Freshwater district will be a very busy place.

“Mulgrave District.—The Mulgrave Mill now presents a very busy scene. The extensive alterations are nearing completion, and the manager expects to handle a large crop. The old mill can hardly be recognised in the splendid plant that has taken its place.

“Planting has been carried out on a large scale this year, and a further acreage of land is still being prepared. Quite a large proportion of the recently planted cane is D. 1135. At Highleigh, Mr. Jno. Cannon has some very fine cane of this variety. He finished planting in October, and the cane when seen looked good enough for a 25-ton crop. Previous to planting, Mr. Cannon had used a couple of tons of burnt lime to the acre on this block, and, after planting, about 4 cwt. of mixed manure. At present Mr. Cannon is using two tractors on his large farm, and speaks most highly of the good work they are doing.

“Babinda.—The Babinda area in general is so porous that constant rain is needed to enable the cane to do its best. The dry spell ended just after the mill started crushing on the 15th, and 3.22 inches were registered between then and the 19th. The general appearance of the crops was rather backward, the ratoon in

particular being very poor. Owing to such a very heavy wet season last year, very little early planting was carried out, and the late-planted cane has still a long way to go. The recent dry spell had its advantages, however, as a large area of land was planted, some of which had struck very well. Although Badila is the principal cane grown here, with a proportion of D. 1135 and H.Q. 426, very many inquiries are being made as to the newer varieties, and a large number of growers have applied for plants from the Experimental Station at South Johnstone. E.K. 1, E.K. 28, Q. 903, and Tableland Badila seemed most in favour.

"A new tractor was also noticed on Mr. Treichel's farm on Babinda Creek, the owner remarking what good work he was now able to do. Grubs are certainly more scattered than in former years, but they have not done much damage this season.

"Borers are in evidence in a few places, but apparently not as much as formerly. Generally speaking, the district is a very prosperous and growing one, especially when one remembers that the sole school accommodation in 1914 was a small temporary building in the mill yard, whilst now the large school at Babinda is supplemented with schools at Mirriwinni and Bartle Frere, whilst a further school at Bellenden Ker is now practically ready to open. Surely this is a good argument for the continuation of the present sugar agreement and its bearing on the White Australia ideal.

"*Mossman*.—When this area was visited during the third week of June, the conditions of the crops, as a whole, were very good; and, as far as one could judge, the cane generally was more forward in growth than in any other sugar areas visited during the month. Very little damage has so far been caused by grubs, nor was the presence of the borer noted. Prior to my visit, some three weeks of dry weather had been experienced, but several light showers, resulting in the registration of 58 points for the week ending 27th instant, relieved the situation, and as the area of young cane was very considerable and the weather still warm, this fall was very beneficial.

"A certain amount of green manuring is being carried out, but very little lime has so far been used. The soil in most cases gives an acid reaction, and bulk samples sent to the Sugar Bureau for complete analysis emphasise the need of lime. So far, no satisfactory arrangements have been made to work the limestone deposit at the 7-Mile. Last year the mill crushed 62,000 tons of cane; and, with a slight increase in acreage for this season, it is more than likely that 70,000 tons will be the result of the 1922 crushing.

"As mentioned in previous reports, D. 1135, H.Q. 426, Badila, 24B (green Goru), B. 147, M.Q. 1, and 1900 Seedling are the principal canes grown in this area.

"Some good crops of D. 1135 were noticed in several places. At one farm a crop of sixth ratoons will again cut a 15-ton crop. The mill expects to start operations about the middle of July, and as it has had a thorough overhauling, and also had considerable additions to its plant, its work during the coming season should be most efficient. Plenty of good labour is available, and the management look forward to a successful season."

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report, dated 7th June, 1922, from the southern field assistant, Mr. J. C. Murray:—

"During June, 1922, the Mackay district was visited. This includes the sub-areas of Farleigh, Homebush, Sarina, Pinnacle, and Owens Creek, and areas in the environs of Mackay township.

"Taking the areas immediately around the city, it is noticeable that the cane has suffered greatly since last February from lack of rain. The different varieties are backward and parched-looking, although healthy, while the young plant cane has struck well, but the leaves present that whitish chlorotic appearance indicative of lack of sufficient nourishment. In many cases the growers, regarding the present standing crop, have not been persistent enough in their cultivation subsequent to planting, and the result is a very hard interspace, with a heavy growth of weeds.

"Regarding cane varieties that are making a good showing in this area, there are Q.970, D.1135, Q.458, Q.813, Malagache, H.Q.285, Q.1121, Q.855, N.G., 24B. Clark's Seedling and Badila also look well on many farms. No serious indications of disease were noticeable, nor was much apparent damage being caused in this locality by insect or fungoid parasites. A number of canes were arrowing or showing inclination thereto. The varieties appearing to arrow more freely than others were Uba and M.1900 Seedling.

"*Farleigh*.—On this area the soil is different to the pioneer flats, and, while inferior in some respects, appears to have better moisture-conversing properties.

Many cultivated areas around Farleigh are still moist, and excepting for the soil temperature, are quite fit for planting. The farmers here also cannot attach too much importance to the value of cultivation as long as it is possible to work in the cane. If a man has a larger area than he can conveniently work, it is better to relinquish some of it for a small farm well cultivated.

"Cane grubs are causing minor losses on the Farleigh farms, although no grower complained of serious loss. The destruction of feed trees—the fig, &c.—is to be recommended as incidental to checking infestation by these pests.

"Cane varieties making a satisfactory showing here are H.Q.426 (Clark's Seedling), Q.813, Badila, Q.1121, M.1900 Sport, and D.1135.

"Several watercourses are running strongly in the Farleigh district, and farmers on the banks of them could irrigate in the majority of cases without heavy expense.

"Owing to the long spell of dry weather, fertilising has generally been considered unprofitable for the recently planted cane. Therefore the percentage of farmers using concentrated manures has been small. Mixed and meatworks fertilisers have been used, but as far as can be observed the results so far are negative. Pulverised limestone has also been tried.

"As mentioned many times previously, green manuring is an important phase of sugar-cane agriculture, and is to be highly recommended wherever the land appears to want texture.

"*Sarina.*—The cane on Plane Creek is probably greener than on any other area in the Mackay district, but the cane itself, in common with other places, is short. However, if good rain fell now, such varieties as 1900 Seedling, which matures about October, would make great growth and probably pull the crushing up considerably.

"Many of the farmers are hard at work planting. That cane which has been planted during the autumn looks well.

"The cane-grub is causing serious loss in places. Continuous and deep cultivation will do much to check the grub attack on the cane roots, as well as ploughing in as much trash and vegetable matter as possible. Composts should be made of the trash with animal manure when possible, and then worked into the soil. Burning of cane should be consistently discouraged, and growers are recommended to plant cane varieties that do not require burning.

"Varieties doing well on the Sarina areas are H.146, Q.1121, H.Q.285, D.1457, Q.813, 1900 Seedling, D.1135, Hybrid No. 1, Q.458, N.G.15, "Pompey," Black Innis, Cheribon, and Clark's Seedling. None of these canes, however, are showing any particular resistance to grub attack, although Badila and D.1135 on an average are not showing signs of marked deterioration. Pompey is proving to be a good cane, with splendid ratooning qualities.

"Practically all the varieties mentioned are showing inclination to arrow.

"In common with other places, the growers have not gone in for much chemical fertilising, being content to wait until rain comes and the likelihood of a more positive result in this respect.

"*Marian.*—This portion of the Pioneer River sugar country is badly in need of rain, and the growers will have to considerably reduce their original estimate. The soil here is porous and well drained, and while it quickly responds to good weather conditions, gets very bad in drought. However, if rain fell at once, the cane would still increase in weight. The growers here are progressive, and probably do as much good farming as any other district in Queensland, and good results have been obtained in the past by cowpea manuring and the use of lime.

"Fertilisers used and giving positive results in normal seasons are sulphate of ammonia and meatworks manures. The soil is a light forest loam with an average acid reaction.

"Varieties showing the best growth at present are Clark's Seedling, 1900 Seedling, Malagache, and D.1135. Badila is a cane that is making a good response on some farms.

"*Pinnacle Plains and Owens Creek.*—These areas are probably the richest agricultural belts in the Mackay district. At present the cane is suffering from want of rain, and loss is being occasioned by grub-infestation in parts, but these factors are not likely to be a permanent drawback to the producing power of these farm lands.

"The railway has almost been completed up Owens Creek, and a considerable area of land hitherto unploughed is being broken up for planting, while there are still large areas suitable for sugar-growing awaiting the settler. The land adjoining Owens Creek is for the most part a deep-made soil, consisting of alluvial and granitic deposits with plenty of vegetable matter deposited from periodical overflows from the

creek. Varieties doing well here at present are M.1900, Badila, Green Goru, Q.813, H.Q.426, Cheribon, Q.458, and D.1135. Of these, M.1900 Seedling and Badila appear to be the best.

"The average reaction of the soil in these parts is acid, and the growers are recommended to obtain supplies of burnt lime and apply 25 cwt. per acre.

"Probably the only other matter necessary to successfully raising cane here is intensive cultivation. It is improbable that artificial manures will be required for some time, excepting, perhaps, on the forest land lying back from the creek. This would be benefited also by crops of green manure.

"The cane right up Cattle Creek to the mill looks dry but healthy, excepting where grubs have made an occasional attack. If rain fell at once there would still be a big tonnage added in the next few months.

"*Homebush.*—The farmers here are busy planting at present, and the management has just completed its plant for transshipping the coming crop to Farleigh. This has involved a considerable amount of labour and money, but the work under Mr. Axam, the Homebush manager, has been carried out with efficiency and despatch.

"As with other districts, Homebush shows the want of rain. Most of the cane is very healthy, however, and there are no complaints by the farmers of any disease of a serious nature or grub infestation.

"The most popular variety growing at present is Malagache. Other varieties being raised successfully are Pompey, Q.1098, M.1900, D.1135, H.Q.426, and Q.813. Pompey is proving to be a good cane, and numbers of farmers are now raising this variety. Q.813 is a variety that is doing well and which the growers should endeavour to get more of.

"The soil here has an average acid reaction, and requires lime more than anything else.

"The farmers should note that it is a bad plan to use a plough in plant cane after it has begun to root."

THE SUGAR-GROWING DISTRICTS OF NORTH QUEENSLAND.

By H. T. EASTERBY, General Superintendent of Sugar Experiment Stations.

The General Superintendent of the Bureau of Sugar Experiment Stations, who has been absent from Brisbane during the past seven weeks (1st July, 1922), states that during that time he visited the sugar districts of Bundaberg, Mackay, Lower Burdekin, Mossman, Cairns, Babinda, and Innisfail.

At Bundaberg it was found that the prolonged dry weather had adversely affected the yield, and the large crop it was anticipated would be harvested has now shrunk a good deal. The standover cane has suffered considerably, and although last year's plantings received an excellent start, the lack of rain during the past three or four months has prevented the cane making the growth it should have done. A large quantity of cane is presenting a withered, and in some cases a dying, appearance. This is exceedingly disappointing, as some few months ago everything pointed to a bumper crop in this and the Isis district, which has also in common with all the southern districts suffered greatly from the prolonged dry spell. A fair amount of planting for next season has been done.

The climatic conditions at Mackay, while not quite so severe as at Bundaberg, have also held the crop back, and the mills have all been obliged to reduce their estimates and postpone their crushings till a later date. It is most unfortunate that the usual wet season this year did not put in an appearance, as the rainfall previous to the end of last year was good and sent the cane crops well ahead. A good deal of new land is being opened up about Mackay. In addition to the fine cane areas at Carmilla, about 1,000 acres of first-class forest and scrub land have been sold at the Pinnacle, on the Hatton line; also new areas near to Carmilla, on the Mackay-Rockhampton line, are being opened up for canegrowing.

Exceedingly dry weather has also been experienced on the Lower Burdekin district, and many areas not irrigated were found to be dying or dead. The irrigated cane, however, looked well-grown, green, and healthy. The cane on the State farm, Home Hill, had made excellent growth, and should cut out well. The Tableland Badila was conspicuous by its fine appearance. The mills on the lower Burdekin, while not realising earlier anticipations, will have a fair crushing. Grubs were found to be doing some damage in places, and as this district has never been affected to any extent, this is giving rise to a good deal of anxiety. Fortunately, so far, they

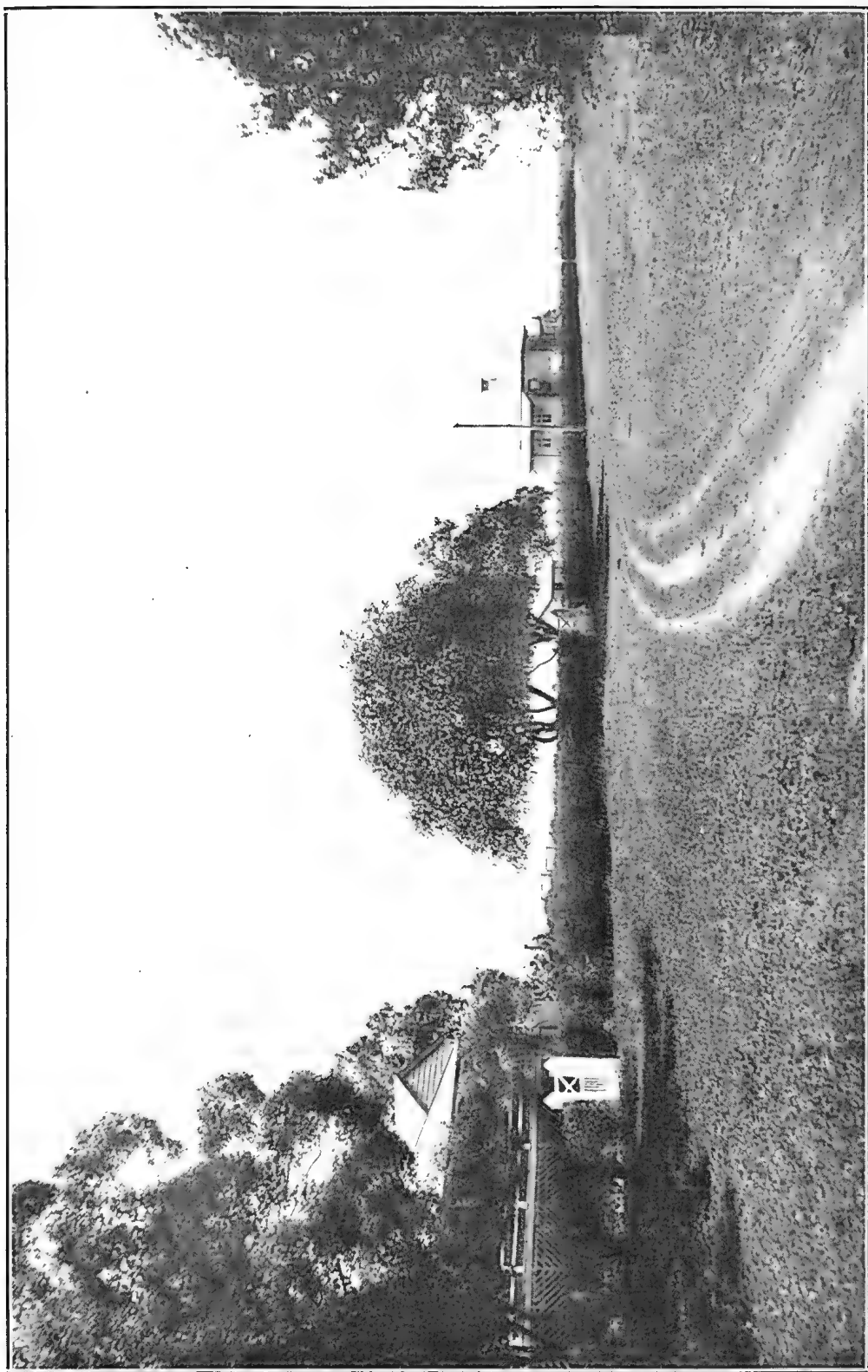


PLATE 9.—SUGAR EXPERIMENT STATION, MACKAY, N.Q.

are confined to the one area. The formation of a Beetle Board and fumigation of the soil by means of carbon bisulphide were recommended.

The Home Hill irrigation scheme is now well advanced, and water is being supplied to some farmers. It is hoped that in a very short time all the farmers in the scheme will be enabled to irrigate their cane.

The Goru and Badila varieties are still holding their own in the Lower Burdekin district. A very fine crop of "Ginger" was inspected upon the farm of Mr. Crofton, at Ayr. This is a cross between Mauritius Gingham and Striped Goru, raised by this gentleman, and it is doing exceptionally well, and is a good density cane. This cane is also doing remarkably well at the experiment station at Mackay.

The cane crop was found to be good at the Mossman district, where it is expected that about 70,000 tons of cane will be crushed. There is very little grub pest visible, and the cultivation and manuring have been good. Large quantities of fertilisers are purchased by the Mossman Mill for the use of farmers, and these are showing good results.

At Cairns good crops were also seen, but a good deal of this cane in the vicinity of Cairns, Hambleton, and Mulgrave was badly affected by grubs. It is very questionable whether it was a wise thing to abandon the collection of grubs and beetles, as was done some time ago. The matter is now under reconsideration, and it is probable that the collection, as a check measure, will again be proceeded with. The present appearance of the estate at Greenhills, near Cairns, is deplorable, and the acres of dead and abandoned cane and trash must afford a breeding place for the grub. Experiments with arsenic and carbon bisulphide have been carried out here on limited areas with a good deal of success where large applications have been used. The principal feature in the Cairns district has been the enlargement of the two mills of Mulgrave and Hambleton, this being equal to another large mill in the district, and has enabled the fine Freshwater district to go ahead. This beautiful area is now covered with magnificent crops of the Badila variety, and presents a beautiful and attractive appearance. A fine powerful crushing plant has been installed at Mulgrave to take the place of the old mills. The new plant consists of three new crushing mills 72 by 35, with three 26 by 48 cylinder engines, all made by the Maryborough Foundry. In addition there are new juice-heaters and a new set of quadruple effects, bringing the heating surface up to 18,000 feet. The first and second mills have been set with 60-foot centres, while between the second and third mills there are 45 feet, thus providing for plenty of maceration. There are also four high-pressure 120-lb. multitubular boilers, in addition to four 70-lb. boilers to be used for the evaporating plant. The capacity of the mill will be 45 tons per hour, the speed of the carrier 3.2 feet per minute, the maximum roller speed being 16 feet per minute. The maceration water will be passed through a juice-heater so as to be very hot upon application. New centrifugals have also been installed. All the machinery, except the crushing plant, will be electrically driven. All this means that the Mulgrave is practically a new mill of at least 150,000 tons capacity, and it is little short of marvellous that the old machinery has been taken out and this new magnificent plant installed between the end of last crushing and the beginning of the present one. The new machinery was built by the Maryborough and Bundaberg foundries, and everything was supplied in first-class condition and to time. The directors are to be highly congratulated, as well as the manager (Mr. Howe) and the engineer (Mr. Smith), who have worked continuously on the job, aided by their staff, and the whole of the installation work reflects the greatest credit on them. Outside the mill 9½ miles of new tramline have been built of 40-lb. rails on the south side of the Mulgrave to open up the Alomba lands, the cane from which now goes to Mulgrave.

Great improvements have also taken place at the Colonial Sugar Refinery Company's mill at Hambleton, which will also be now capable of dealing with 150,000 tons. A new mill has been installed, bringing the total to four, and much other machinery. The new area of Freshwater has been added to this mill, and the management expect to draw 50,000 tons of cane from that area this year. The enlargement of these two mills is an excellent thing for Cairns, and has meant the opening up of new tracts of fertile cane lands.

The Babinda areas are presenting a good appearance, though some of the late-cut ratoons are backward again this year. The grub pest is not much in evidence in the southern parts of the cane areas. The mill made a fine start on the 14th May, the cane being then of excellent sugar-content. Dry weather had been experienced for about four weeks prior to this, which had greatly assisted farmers. The total rainfall from 1st January to 31st May this year had been 144 inches, as against 186 inches for the same period last year. The mill has received a first-rate overhaul this season, and is confidently expected by the management to do the best of work.

There are very few foreign farmers at Babinda, the total only amounting to 7 per cent. There are, however, a large number of non-British cutters operating this season.

The Innisfail district is not greatly affected by grubs this year. There are practically none about Goondi, but they are more prevalent at South Johnstone. The cane generally is looking well, and farmers are looking forward to a good harvest. For the first five months of the year some 80 inches of rain fell. A dry spell of about four weeks took place from the middle of May to the middle of June, when rain again commenced. It is hoped, however, that the remainder of the season will be comparatively dry, so as to ripen up the cane and assist farmers to get their crops off and in their cultivation.

The annual field days at Bundaberg and Mackay were held during Mr. Easterby's tour, and were eminently successful. Record attendances of farmers were secured, and these displayed an absorbing interest in the station work with cultivation and varieties. Both stations looked particularly well, and great credit is due to the officers in charge (Messrs. Pringle and Keogh).

The experiment station at South Johnstone was presenting a fine appearance, and good crops are anticipated. About 200 seedlings were raised last year, and these are now planted out in the field and making excellent progress. The officer in charge (Mr. McWalters) has carried out his duties in a most satisfactory manner.

Addresses were delivered in nine centres, at which the schemes for the establishment of district councils and producers' associations in connection with the Council of Agriculture were brought under the attention of farmers and discussed. The proposals were well received.

The plantings for next year have so far been good in most districts.

To sum up, it may be said that the crops above Townsville will be very good, while south of that they will be well under the average. It is expected, however, that the crop will reach the amount required by the consumers of Australia. A revised estimate will be issued by the Bureau in a few days.

CANE PEST COMBAT AND CONTROL.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report from the Entomologist at Meringa, near Cairns, Mr. E. H. Jarvis, dated 11th July, 1922:—

“GRUB-FUMIGATION AT GREENHILLS.

“The experiments with carbon bisulphide carried out by the C.S.R. Company at Greenhills last February have yielded data which should prove serviceable when dealing with the beetle pest next season.

“The cane on Block J6, which was fumigated towards the end of February, after showing evidence of grub attack, appeared at first likely to recover (see March report), but did not ultimately regain sufficient hold of the ground to withstand subsequent dry conditions experienced from 17th March to 15th April, which, being accompanied by strong winds during the latter month, caused the cane in both treated and control plots to fall over. This experiment shows us the advisability of fumigating early in the season, at a time when grubs are not large enough to materially injure the main roots, and the soil is usually in drier and better condition for such treatment than is the case later on during the wet season.

“A capital instance of benefit to be derived from early treatment may be seen at Greenhills just now (20th June), on Block J6, where the manager, Mr. Hoelscher, fumigated a quarter-acre plot before the cane had become affected by grubs.

“This plot of Badilla received half an ounce of carbon bisulphide to each stool (quarter ounce on each side), while the adjoining plot was not fumigated. Although the cultivation, manuring, and character of soil was the same in both cases, the cane on check plot is noticeably shorter than that on the treated area, this being due to the presence of grubs, which by constantly severing the main surface feeding-roots have materially checked growth of the stools.

“As reported last April, it is possible to successfully fumigate, not only the grubs, but both pupæ and eggs of our grey-back cane-beetle.

“A newly-hatched grub, however, breathes by means of spiracles, of which there are nine on each side of its body, opening directly into trachæ that subdivide again into small and still smaller air-tubes. During this life-cycle stage it is, of course, very susceptible to fumigation, even while in its first instar, and too small to do serious damage to cane roots.

"Then, again, the spiracles of the pupa or chrysalis, which are even larger than those of the grub, afford ready admittance to gaseous fumes.

"In normal seasons bisulphide fumigation should be commenced about the middle of January; not, however, until termination of the egg-laying period, when the ground is usually in good condition for such treatment. Later on, after the rainy season has set in, excessive moisture interferes with the soil porosity, and moreover, grubs being then in the third stage, have started to seriously injure the root system.

D. 1135 AT HIGHLEIGH.

"Learning from Mr. Wilson Irvine that D. 1135 was doing well in the above locality, and, as a result of careful cultivation, had shown a marked tendency to produce abnormally stout canes, a visit was made to Highleigh on the 13th instant, when Mr. J. Cannon drew my attention to certain stools of this variety, planted by him during August and September, which were bearing exceptionally fine canes.

"The block planted in August was manured, but had no lime, while the September planting was treated with 35 cwt. of lime per acre.

"Seeing that D.1135 appears to thrive well in the Cairns district, and is more resistant than Badila to root-eating grubs and to the weevil-borer, growers should not fail to embrace any chance of obtaining an improved strain of this variety. This can be done very simply, by selecting only the stoutest canes from a number of stools for seed purposes. These should be planted together on a small area (one-eighth of an acre, or even less), the sets being cleanly cut in order to minimise risk of invasion from fungi, and at the same time examined for evidence of redrot or weevil-borer, &c. If growers would take the trouble to plant a patch in this way, most of the resultant stools would be found to consist of stout canes, some of which would tend to be finer than any of the selected seed. By again using for plants the canes derived from a plot of this kind, a few acres of an improved strain, of uniform quality throughout the plantation, could be obtained in the shortest possible time. Such artificial selection is within the reach of every intelligent farmer; and since Nature's law, that like produces like is indisputable, any time so expended could not fail to yield a substantial return from a monetary standpoint.

"It should, however, be borne in mind that when growing a patch for seed in this manner the land chosen for the purpose should, if possible, be of uniform character, and receive similar treatment as regards manuring and subsequent cultivation.

"CAIRNS SHOW EXHIBITS.

"Some time was occupied this month in the preparation of entomological specimens and other exhibits for staging at the annual meeting of the Cairns Agricultural, Pastoral, and Mining Association.

"This took the form of coloured diagrams and charts illustrating, for the most part, the underground working and life-cycle stages of our principal cane-beetle, and the effect produced by same upon the growing crops during each month of the year; a small general collection of insects, including the eggs, grubs, and pupæ of the root-eating scarabæidæ affecting cane; and other exhibits of a scientific nature dealing with the chief parasitic and predaceous enemies of our cane-beetles and their larvæ. The exhibition was well attended, and many growers availed themselves of our invitation to freely discuss the question of grub and beetle control, with the result that much interesting exchange of opinion took place regarding several complex phases of the all-absorbing cane-grub problem.

"EARLY HISTORY AND ORIGIN OF THE GRUB PEST.

"Damage to cane from the attacks of cockchafer is recorded as having occurred first at Mackay, as far back as 1872; and twenty-three years later (1895) when the trouble had assumed a serious aspect, Mr. Tryon was asked to investigate the matter and recommend measures for controlling the pest. About that time grubs were beginning to make their presence felt around Cairns, and we find Mr. S. W. Davids, the late manager of Mulgrave Central Mill, in his annual report for 1897, calling attention to the appearance of grubs and cane-beetles in various spots in the neighbourhood of Gordonvale, and suggesting that steps be at once taken to check the evil. His advice was acted upon, but, as is usual in such cases, the matter was not regarded seriously by the growers, and accordingly the following year Mr. Davids reported as follows:—"The ravages of the grubs are very evident, and unless steps are taken at every opportunity to destroy the grubs and beetles when met with, we may look for the same disastrous results, as experienced in other sugar districts."

"The above correspondence is doubly interesting from the fact that, in addition to throwing considerable light on what may be termed the prelude to an invasion that a few years later assumed colossal proportions, it also enables us to determine the source from which most of the present trouble originated.

"Data obtained by the writer in 1915 goes to show that infestation of the cane lands around Gordonvale was in the first instance brought about by beetles that did not originate in that locality, but were transported there from extensive breeding-grounds situated either in the vicinity of Alooomba or several miles eastward of that district. This view of the case is not merely theoretical, but may be taken as an established fact, verified by the experience of leading growers, many of whom have had unique opportunities of observing the gradual encroachment of this pest during the past twenty to twenty-five years. Mr. R. E. Riley, late Chief Cane Inspector at Mulgrave, who during his long residence at Gordonvale made many interesting observations in this connection, appears to have been the first to notice in the early days (1897) that our grey-back cockchafer bred habitually in enormous numbers around Alooomba over extensive areas supporting the so-called 'blady-grass' (*Imperata arundilacea*), which constitutes one of the commonest native food-plants of this beetle. Subsequent observations by the writer have shown also that its grubs subsist very freely on roots of other cereals, notably the 'carpet-grass' (*Paspalum platycaule*) that commonly covers recently cleared scrub lands.

"When cane was first planted at Gordonvale no serious injury followed until some years later, from which we may infer that when beetles are collected in any given locality others do not, as some growers imagine, immediately take their place, but reinfection from the outside bush is a matter of time—perhaps of some years.

"Any beetles chancing to invade such cleaned-up localities the following season may, therefore, be presumed to come from adjoining cultivated areas that had not been collected over; so that benefit would result, as a matter of course, although not always to the deserving parties.

"If, however, a general systematic collection could be made throughout our district and kept up for a few years, destruction of the vast host which have gradually entrenched themselves and are breeding within the tract of country devoted to the cultivation of sugar-cane could hardly fail to afford a measure of relief.

"The foregoing evidence seems to me to be supported by experience in the past at Mackay, and, I believe, other sugar centres, where it has been noticed that when collecting has been given up—owing to a scarcity of beetles—a few years have generally elapsed before a fresh invasion of the pest has again called for action."

THE 1922 SUGAR ESTIMATE.

The General Superintendent of the Bureau of Sugar Experiment Stations states that, owing to the very dry weather experienced in the districts below Townsville during the usual wet seasonal period, it has been necessary to reduce the previous estimate of the Queensland sugar crop from 290,000 tons to 283,000 tons. This is only a rough estimate, as a warm moist winter may increase the yield as a dry frosty period would reduce it. This tonnage, however, if realised, will suffice for Australia's requirements, and with the production of New South Wales may leave a small carry-over. The production in 1921 for Queensland was 281,000 tons, and a good proportion of this was made up during the latter part of the season, which was very favourable, the earlier estimates being considerably less.

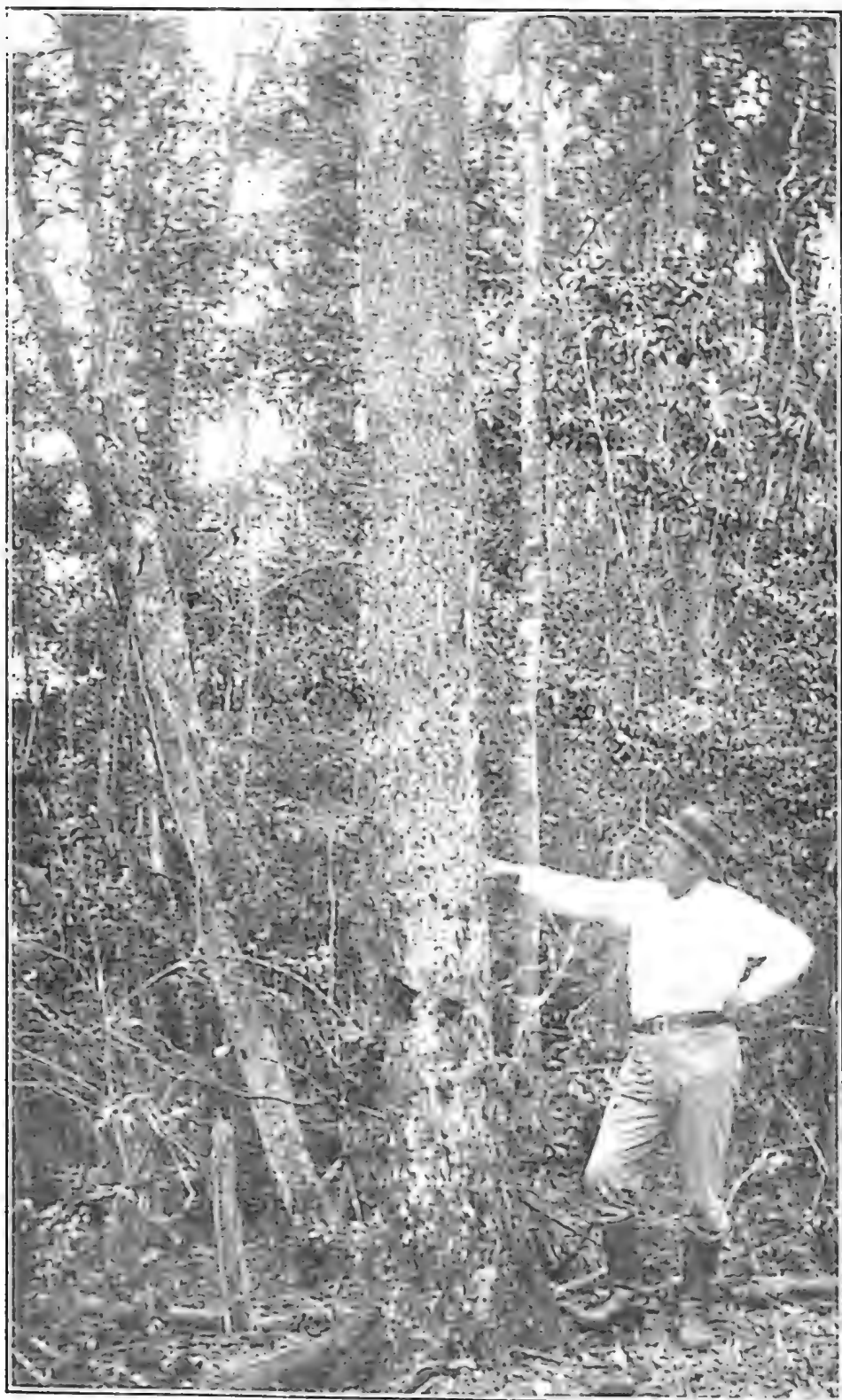
QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS,
Assistant Botanist.

No. 13.

THE CROW'S APPLE.

The Crow's Apple (*Owenia venosa*) is common in the drier scrubs of the coastal area of Queensland, from the border of New South Wales to Rockhampton, Queensland, in such places as Boonah, Rosewood, Benarkin, Nanango, Many Peaks, and as far west as Eidsvold. It is confined to Queensland. The trees attain a height of about 70 feet, and a barrel diameter of about 1 foot 6 inches. The barrel is not conspicuously flanged at the base. The bark is grey with patches of brown, very scaly, shed in square and oblong pieces, and when cut is purplish-brown, but paler towards the sapwood, measuring $\frac{1}{2}$ inch thick on a tree with a barrel diameter of 1 foot 3 inches. When grown in the open the trees form a shapely round head of dense foliage. The fruits are red, globular, 1 to 1½ inches in diameter; the outer fleshy part surrounds a hard inner part, which contains from two to four cells, each cell containing a single seed.



Photo, by the Authors.]

PLATE 10. THE CROW'S APPLE (*Owenia venosa*).
A specimen in the Imbil Scrubs.



PLATE 11.—THE CROW'S APPLE, FLOWERING TWIG,
A.—Dried fruit,
B.—Section of fruit.

A CHILLAGOE ORCHARD.

By ERNEST B. FREEMAN.

Just 2 miles out of Chillagoe, and half a mile from the north side of the railway line, going to Mungana, is one of the heads of Metal Creek, and on it is situated the home of Mr. and Mrs. T. Vautin. The land, a piece of heavily-timbered forest, was taken up a little over ten years ago, and all the spare time and spare money during that time has been put into it.

In preparing the land for fruit-trees, Mr. Vautin used dynamite to blow up the subsoil, thus giving the tap-root a chance to go downwards, and enabling the tree to bear fruit upwards. The benefit of this procedure is visible to-day. A well was sunk and timbered, good water being struck at between 20 and 30 feet. A 1,000-gallon

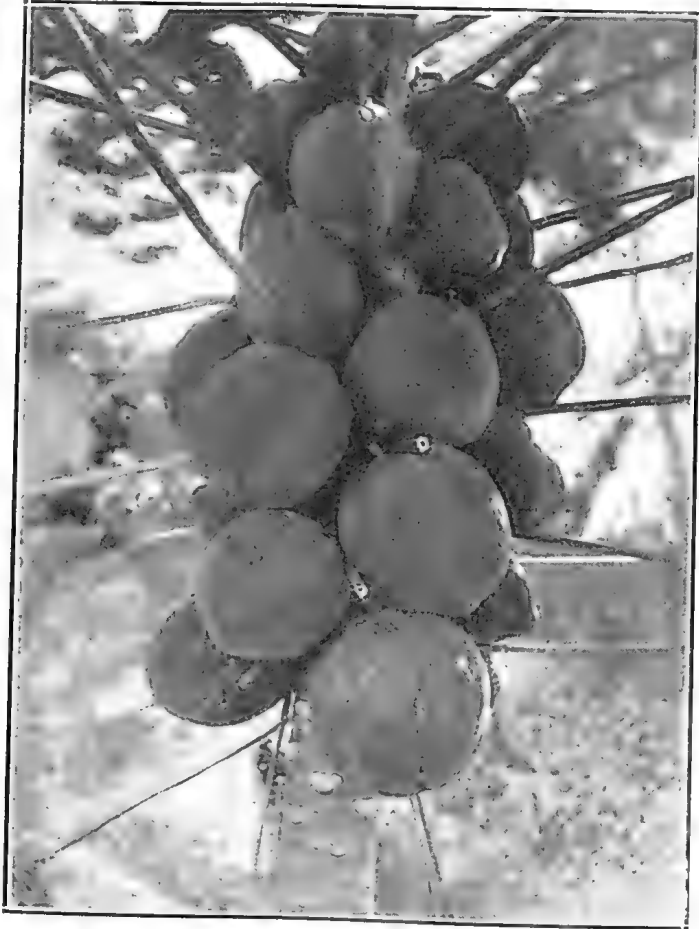


PLATE 12.—PAW-PAW TREE GROWING ON MR. T. VAUTIN'S ORCHARD, METAL CREEK, CHILLAGOE.

tank was elevated on blocks several feet high. A lift and force pump were installed, the first power being supplied by a weighted cart-wheel which was used up to eighteen months ago, when a windmill was erected which supplies the power to-day. Except for the building of the cottage, Mr. Vautin himself has split the posts and erected the fences, and the goat and fowl house and yards. About sixty fowls and the same number of goats are kept on the place, as well as one horse. Even the windmill he put together himself, only getting assistance in its elevation. During all this time he has been ably assisted by Mrs. Vautin, who is a first-class housewife and maker of jams and preserves. When the Chillagoe Company closed down, Mr. Vautin went to Babinda, being away about two years, and Mrs. Vautin bravely bore

with the loneliness (they have only one child—a fine boy), and kept the home fires burning in the truest and best sense of the word. When Mr. Vautin returned to stay, he took up his home work where he had left it off, and he kept it going again. A few months ago he decided that he had enough planted to get a living with, and so commenced to hawk fruit and vegetables. One result of this is that he has had to secure assistance. To-day the orchard and garden show what a man and woman can accomplish when they are both agreed on the one objective.

The land tenure was miners' homestead lease, which has been raised to miners' homestead perpetual lease. The State Government is the landlord, the rent is low, the landlord is merciful, and there is plenty more land there on the same tenure.

Mr. Vautin has accomplished the above without raising a mortgage or even borrowing from the Agricultural Bank, so it is all his own, and neither rent nor interest day has to him any terrors.

One great enemy here is the white ant, which bores up into the centre of the trees. They may, however, be overcome by attention and cultivation.

A reliable supply of good water can be obtained anywhere by sinking from 20 to 40 feet. The climate is very equable, and the locality is free from frost.

THE SCRUB AND FOREST LANDS OF QUEENSLAND.

BY MAJOR A. J. BOYD, F.R.G.S.

About sixty years ago, when I was working a scrub farm only a few miles from Brisbane, which had a frontage to a fairly large creek (the Oxley, a tributary of the Brisbane River), several enterprising Southern farmers as well as new arrivals from Great Britain purchased land—some on the Darling Downs plains and others near the eastern cities, in order to be near a market for their produce, thus avoiding long land-carriage in the days of no railways and bad roads. Those who settled on the scrub lands near the coast had the advantage of water-carriage by tidal rivers and creeks.

One of the Victorian arrivals was a well-to-do farmer who was making his home on a large scrub farm. In the course of conversation he said: "Wheat-growing I have been brought up to, and I know how to manage on the Western country; but here, on this scrub land, is where I am 'at sea.' Here is where I want instruction in clearing this jungle, and in planting seasons and methods." It is, then, with a view to assisting the newcomer of to-day to start properly, and to manage a scrub farm properly, that I give the following hints, which are the result of many years' experience gained in the early days of rough farming in Queensland.

There is nothing new to-day as regards getting rid of the thousands of trees constituting what may well be called a jungle. There is no royal road to making the land bear a crop. It must be handled to-day as it was handled by us—the first settlers. It was felled with the axe, and the work demands some dexterity in the use of this invaluable tool.

Most of the riverside scrubs contain many valuable timber trees, such as red cedar and pine of three kinds (Bunya, Kauri, and Moreton Bay or hoop pine), but very little cedar is now to be found in districts where it formerly abounded; other timbers are yellow-wood, beech, and hickory. Thousands of feet of such timber have been burnt off in the early days of scrub farming. Obviously it would be unwise to destroy the valuable timbers mentioned, for which there is always a market. To fell scrub properly it is well, if possible, to select a time when the sap is down, and this occurs about the winter months, when the timber will dry quicker, and consequently burn off easier and more thoroughly than if felled when the trees are full of sap, although even this difficulty may be got over by judicious felling.

It is a common thing for scrub-fallers to cut half through a number of small trees and then to drop a large tree on top of them; when the large tree falls it naturally brings down all the smaller ones with it. But now mark the result. The small trees which were only half cut through are mostly not detached from the stumps. A strip of bark and timber on the unfell side still forms a connection with the roots, and consequently the sap continues to flow, and the tree, although felled, remains green, and, of course, will not burn well for months, and probably not at all until it has been handled a second time. "The longest way round is the shortest

way home" is an old and a very good adage, and it applies to this case. By the method mentioned the trees will no doubt be quicker felled, but when we come to the clearing of them off the ground, then it is that we find out the mistake. But it is then too late; the mischief is done, and we can only make the best of it. This has been my own experience, and I have since cleared many acres of scrub, both on the coast and inland. [The practice nowadays is to nick the smaller trees with a belly and back cut, and this method ensures the bringing down of the saplings and small trees clear of the stump when the "driver" is felled.—Ed.] To fell scrub properly and obtain a good burn, the first thing to do with a standing scrub is to "scrub" or "brush" it—that is, to go through it with axe or a "bill" with a long handle, and cut down all the small trees, saplings, and shrubs under 6 inches in diameter, taking care to lay them flat by lopping any branches sticking up, and at the same time (in a vine scrub) all the vines, lawyer-canes, and other creeping and climbing vegetation must be cut to the ground and cleared as high as possible from around the larger trees. Neglect of this vine-clearing may lead to serious accidents when it comes to felling the timber.

Assuming this to be thoroughly done, we may proceed to deal with the larger timber and drop it upon the already partly dried small stuff. Every tree, as it is felled, should be lopped as to its branches, and the whole laid as flat as possible.

In proceeding in this manner we are simply carrying out on a large scale the building of a small fire. The small stuff lies below, the larger limbs above, and the heavy trunks above all.

Should the scrub contain many bottle trees or stinging trees, some trouble arises, as these are very large and pulpy, and contain such an enormous mass of moisture that they will not readily burn. My plan was to split up the nettle trees and allow the bottle trees to rot on the ground. The latter were very large and numerous on my scrub farm, "Forest Hill," near Laidley, and gave little trouble, as they were easily felled and rotted rapidly. While the felled trees are drying the farmer has time to attend to preparing fencing stuff to be erected after the burn-off. The fence should not be erected until after the fire, say, about six or eight weeks after the last of the timber has been felled, according to the state of the weather. The best time to burn is at night if there is a nice breeze blowing. [The practice to-day in most scrub districts is to choose a hot, dry day, with the wind blowing from a suitable direction.—Ed.] I should have mentioned that the "burn-off" must not be deferred until the leaves have all dropped off the limbs. Should this have happened, a bad burn is almost sure to be the result.

Fire should be applied at several points at once, for it is a well-known fact that a large fire always creates a draught, and this materially helps to a good burn-off. If the timber has been well lopped, has lain a sufficiently long time, and a suitable day chosen for firing, it will be found that a clean sweep has been made of all the fallen timber, a few of the largest logs alone being left. These, however, will present no serious obstacle to subsequent planting operations, and will be easily got rid of later on.

In the case of a brigalow scrub, after a good burn scarcely any logs remain unburnt.

If the burn has taken place between August and December, corn-planting may be at once proceeded with. There will be no weeds to chip—the land presents to the view only a vast area of charred stumps and scorched ground, relieved by numerous patches of white ashes, still further enriching the fertile scrub soil. It is well to scatter the ash-heaps to utilise them to the best advantage.

Although the soil is apparently a mass of roots, these are generally soft and are easily cut through by a No. 3 breaking-up hoe.

Two crops may now be sown—viz., maize, and at intervals of from 20 to 30 feet; pumpkins may be sown on the same land without detriment to the corn crops. Rhodes grass may also be broadcasted along the rows, thus ensuring, in favourable seasons, a grassed paddock by the time the corn is ready to pull.

STUMPING.

Now, as to stumping the land to fit it for the plough:—It takes about three years for the general mass of medium-sized stumps to rot. The smaller ones will have disappeared in about two years, owing to constant cultivation of the soil and consequent destruction of the roots.

Various plans have been adopted at different times to bring the land under the plough. Some farmers used to break up the whole of the land intended for crops, taking the stumps out on a face. Others merely took out the stumps without breaking up the land, and, when stumps and roots were burnt, broke the ground up with a

strong bullock-plough—a work easily performed, as the tangled masses of roots are completely rotted by the end of three years. Once the plough can be set to work, the cultivation of the land differs very little from that adopted on plain lands. As already stated, the first crop generally sown on new scrub lands is maize. This is done easily with a breaking-up hoe or hand-planter, the soil being a rich alluvial, consisting mainly of the rotted accumulation of fallen leaves, trees, &c. The planter marks out a straight line through the maize of stumps by putting in stakes, with a piece of white paper or rag on the top, at intervals of 40 or 50 yards from the starting point. Then, by raising his hoe, as he advances in a line with the sticks, he manages to keep a fairly straight line. In later days an American hand-planter has completely superseded the old-fashioned hoe for maize-planting in scrub lands.

The seed was carried in a canvas bag, with a wide mouth, slung round the waist. One blow of the hoe is sufficient to make the necessary hole, into which from three to five seeds are dropped according to the soundness of the grain. A backward pushing of the seed and the planter then advances far enough to plant one foot on the last hole planted. The pressure will not harden the surface soil on the virgin scrub land; on the contrary, it just gives the pressure required to settle the soil over the seed. This regular advance brings him to the proper distance at which to make the next hole. The proper number of seeds is dropped, and so the process goes on till the whole field is planted. At intervals, as above mentioned, of, say, 20 or 30 feet, pumpkin seeds are dropped between the maize.

Now, a word or two about seed corn, which is a very important matter not to be neglected:—It has always been the custom with corn-growers to select the largest flat grains for seed. There can be no doubt that if the round seeds are sown the crop will turn out a poor one. I have made experiments with these round grains taken from the upper portion of the cob, and invariably the cobs have not filled properly. But there is one point in connection with seed corn which is perhaps not generally known, and that is that the largest grains do not always necessarily produce a large plant. The size of the embryo plant within the seed bears no relation to the size of the grain; of course, it can well be understood that the larger the seed the more food material there is to enable the plant to resist adverse influences and to enable the embryo to push its way up from a depth which would be fatal to a weaker germ. In this opinion I am borne out by the Agricultural Research Association of Aberdeen. So far back as 1896 the work done by that association was concerned chiefly with the cultivation of oats and the grass crops. With regard to the “dressing” or selection of oats for seed, the report said: “It has been proved by experiment that, contrary to what might have been anticipated, large seeds afford no ground for expectation of the production of large ultimate plants or heavier crops, nor do they secure any earlier germination. What they do secure is power to reach the surface, though deeply deposited, and a stronger beard, which will enable the plants to withstand uncongenial conditions of soil or season at the early stage of growth.

“The subject was followed up, and it was found by investigation that the size and strength of the embryo plant within the seed does not bear any relation to the size of the seed. Small seeds may often contain larger or stronger embryos than a large seed.” To continue my subject:—When the farmer has cleared his land and sown the seed, nothing remains to be done for the next four or five months in connection with the first corn crop, as there is little growth of weeds on the newly burnt-off soil, and no cultivation is required unless potatoes have been planted, as these will require to be hilled up.

In a favourable season, on such soil as I have described, the maize grows with extraordinary rapidity, and will throw up suckers here and there which should be removed. This labour is not great and the suckers provide good fodder for cattle, horses, and pigs. Just before the stalk begins to turn yellow the flowering tops may be cut off just above the grain cob. This will not injure the crop, as the pollen from the flower head has long ago performed its duty by fecundating the tassel of the cob, which now requires no more nourishment from it.

Corn should be pulled on dry days and not until the grain has set hard enough to resist the pressure of the thumb nail. This test also applies to the pumpkin, whose ripeness may further be ascertained by noticing that the curl at the stalk is withered. When the cobs are safely in the barn, husking should be done quickly, and the cobs should remain for some days to dry, as the drier it is the better it will thresh.

The forest lands suitable for agricultural settlement will form the subject of a future paper.

A NATIVE FODDER TREE FROM NORTH QUEENSLAND.*

By C. T. WHITE, F.L.S., Government Botanist.

Some years ago the late F. M. Bailey recorded a species of *Sideroxylon* for North Queensland as *S. arnhemicum* (a Northern Territory species), and at the same time quoted Mr. G. Jacobson to the effect that the tree was a valuable fodder species, stock being exceedingly fond of the leaves. I recently collected specimens of this tree in the Gilbert River district, and, in looking through our herbarium specimens, found we had the same species from several Northern localities under *S. arnhemicum* and *S. Pohlmannianum*. After examination of a large series of specimens, I have come to the conclusion that it is only a hairy form of the latter. I had at first thought it represented a new species intermediate between *S. arnhemicum* and *S. Pohlmannianum*, and had drawn up a full description of it. It was included by Mueller in his original comprehensive description of *Sideroxylon Pohlmannianum* (under *Achras* in *Fragm. Phytogr. Austr.* v. 184), but I certainly think it should at least be given distinct varietal rank and propose to name it as a new variety.

S. POHLMANNIANUM var. *VESTITUM* n. var. *varietas nova foliis utrinque dense pubescentibus.*

Description.—A tree 25–30 feet high with a dense spreading head, branchlets rather stout, prominently marked with the scars of old inflorescences, younger parts densely ferruginous-pubescent. Leaves softly and densely pubescent on both faces, lanceolate or elliptic, petiolate, petiole $\frac{3}{4}$ –1 inch (.7–1.5 cm.); long, $1\frac{1}{2}$ –2 inches (4–5 cm.) broad. Flowers in dense clusters at the old nodes below the leaves, pedicels $1\frac{1}{2}$ lines (3 mm.) long, softly pubescent. Calyx-segments 5, densely pubescent outside, very much imbricate, orbicular, about 1 line (2 mm.) in diameter. Corolla lobes 5, truncate, slightly longer than the calyx. Ovary surrounded by a dense ring of long hairs, 5-celled. Fruit more or less globular about $\frac{3}{4}$ -inch (2 cm.) in diameter. Seeds compressed, 6–7 lines (1.3–1.5 cm.) long, 4 lines (9 mm.) across, dark brown, hard and glossy, hilum or scar nearly the length of the seed. *S. arnhemicum*, Bail. Bot. Bull. v., Depart. Agric., Brisbane, p. 19 (1892); Queensland Flora, pt. iii., p. 956 (1900), not *Achras arnhemica* F.v. M.

Habitat.—Gilbert River, C. T. White (type); Musgrave (Cape York Peninsula), Geo. Jacobson; Endeavour River, W. A. Persich; Ollera Creek, near Townsville, W. Young; Walsh River, T. Barclay Millar. So far as known, confined to North Queensland.

Properties.—The late F. M. Bailey (l.c.) quoted Geo. Jacobson to the effect that cattle and horses are very fond of the foliage, and that in times of scarcity of feed the tree is cut down for fodder. W. Young, in sending specimens for identification from Ollera Creek, North Queensland, stated that stock were very fond of the leaves. Mr. F. Turner (Proc. Linn. Soc. N.S. Wales, vol. 41, p. 101), quotes Mr. A. H. Cooper to the effect that *S. arnhemicum* is a valuable fodder tree in North Queensland; most likely the tree now described is referred to.

Botany.—The normal form is common in many parts of the State, but we have no record of its being used as fodder. I have no doubt, however, it will be found equally useful when tried, as will also most likely the true *S. arnhemicum* from the Northern Territory. The three trees are very much alike in character, the chief distinctions being—

Leaves pubescent on both sides.

Leaf blade broadly elliptic, 3–3 $\frac{1}{2}$ inches (7.5–9 cm.) long, 2–2 $\frac{1}{2}$ inches (5–6.3 cm.) broad, tapering into a petiole of 1–1 $\frac{1}{2}$ inches (2.5–3.7 cm.) flowers 6-merous (?). *S. arnhemicum*.

Leaf-blade lanceolate or narrow elliptic, blade 3 $\frac{1}{2}$ –6 inches (9–15.5 cm.) long, 1 $\frac{1}{2}$ –2 inches (4–5 cm.) broad, petiole $\frac{3}{4}$ –1 inch (.7–1.5 cm.), flowers 5-merous. *S. Pohlmannianum* var. *densevestitum*.

Leaves, with exception of the midrib and main lateral nerves, green and glabrous on both sides. *S. Pohlmannianum* (type).

Acknowledgment.—I am indebted to Mr. W. Laidlaw, B.Sc., Government Botanist, Melbourne, for loan of type material of *S. arnhemicum* from the National Herbarium for purposes of comparison.

* As this article describes a new variety, and is of some botanical interest, it is unavoidably somewhat technical. A brief Latin diagnosis of the variety is given in accordance with the International Rules of Botanical Nomenclature.

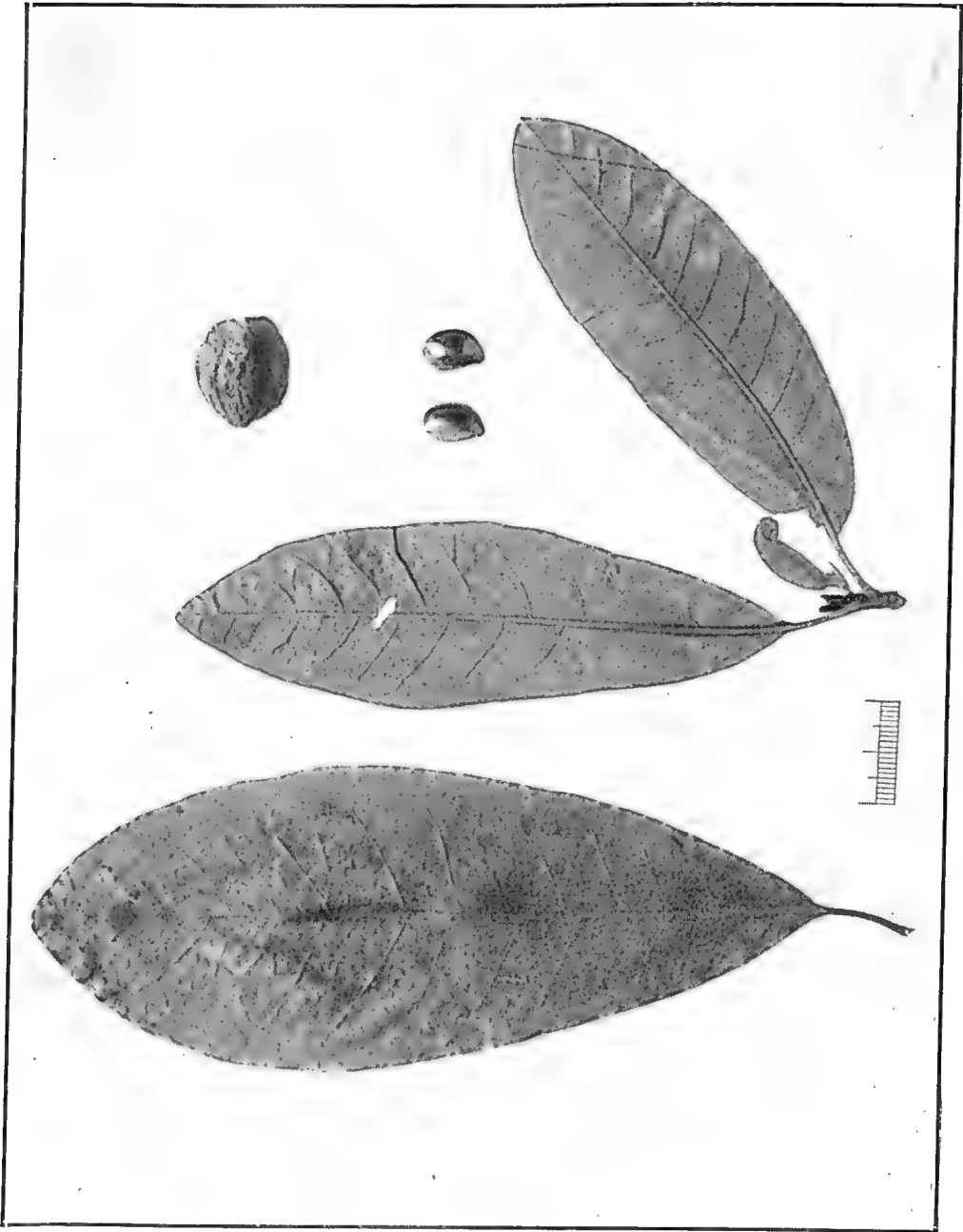


PLATE 13.—A NATIVE FODDER TREE (*Sideroxylon Pohlmannianum* var. *vestitum*).

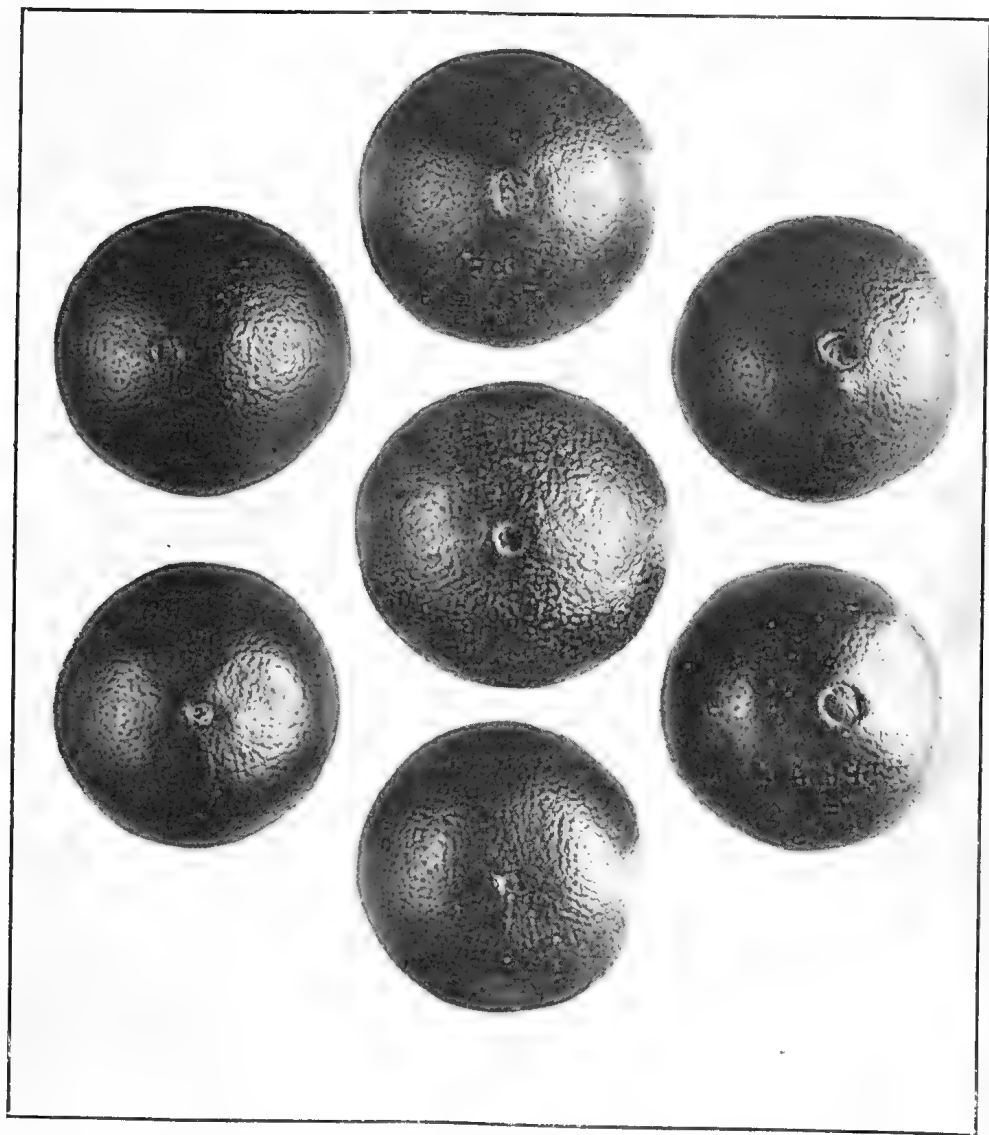


PLATE 14.—NAVEL ORANGES GROWN BY MR. C. ROBINS, MIRIAM VALE, ALPHA,
CENTRAL WEST.

ELECTRIC MECHANICAL COTTON-PICKER.

C. D. Wagoner, writing to the "Farm and Live Stock Record" (United States, America), gives a most favourable report by Mr. L. C. Stukenborg, a resident of Covington, Kentucky, United States, America, on the latest invented machine for cotton-picking, for the manufacture of which a strong company has been formed under the name of the Cotton-Picker Company of America. The original machine was put to the first test in 1917, and since that time many valuable improvements have been added to the invention. The company has prepared and issued an exhaustive pamphlet dealing with the five great factors of the cotton crop and how to correct them. These factors are cultivation, harvesting, ginning, spinning, and weaving.

For the present we need only consider the matter of harvesting. We know that many devices relative to cotton-picking machinery have been invented in the past, and some of them have been described and illustrated in the "Queensland Agricultural Journal." One machine was invented and built in Brisbane some years ago,

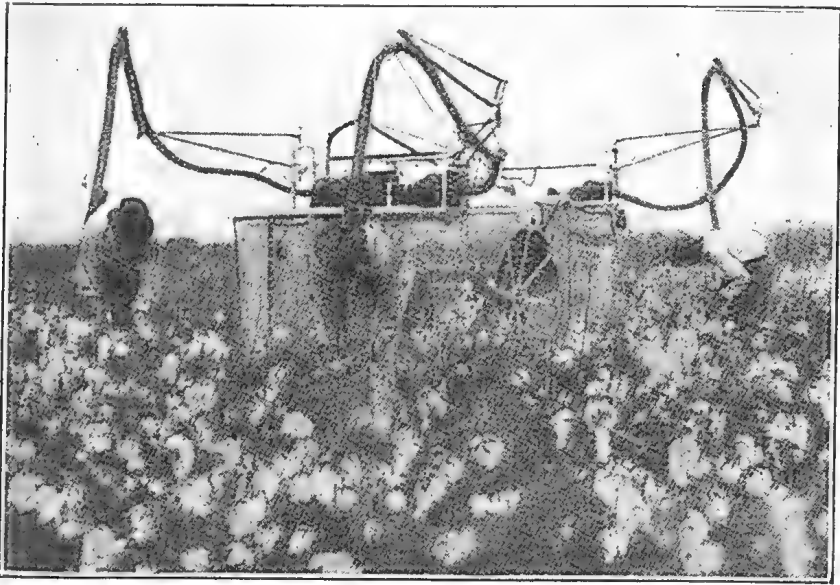


PLATE 15.—STUKENBORG ELECTRIC COTTON PICKER.

and its work was demonstrated by the inventor, Mr. Daniel Jones, a cotton-grower in West Moreton in the days when cotton-growing was taken up and appeared to have become an established industry in Queensland during the Civil War in America. The machine did fairly good work, but shared the fate of most of its predecessors.

When the machine now to be described was invented by Mr. Stukenborg, his greatest difficulty was to remove the cotton from the brushes which swept the ripe cotton from the tree, but in this he eventually succeeded.

The crude and primitive method of picking cotton is to a very great extent responsible for the many abuses of the cotton crop, resulting in some enormous losses. Picking is the most expensive item in the production of the cotton crop. One man can cultivate as much cotton as five or six good pickers can gather. This is almost prohibitory; therefore the labour required to gather the crop should be equalised with the labour necessary to cultivate the crop.

Cotton picked by hand is injurious to the fibre. In pulling it from the boll the action of the fingers on the fibre as it accumulates in the hollow of the hand puts it through a twisting, rolling, matting, and squeezing process, and when placed in the sack or receptacle it resembles snowballs. Also, the fingers take in all the dirt, leaf, and trash, and mix it through and through the cotton fibres, so that it becomes very difficult to remove, and it *must be removed* before the spinning operation takes place. Hand pickers leave the cotton in a terrible condition. To make matters worse, it is again abused by being dumped here and there, only to be tangled, wadded, and pressed all the more compact; and therefore it cannot cure itself properly. It is then taken to the gin to be assassinated, which destroys much of its value, divisibility, durability, and strength. Being in that condition, there is little doubt that the gin

saws will cut and tear the fibres all to pieces, affecting materially the uniformity of staple, grade, and classification. Hence the producer pays the price in a lesser price received for his cotton for want of a good mechanical cotton-picker.

Such a machine has apparently been invented, and is known as "The Stukenborg Cotton-Picker." It is not merely an experiment, but a real machine which coaxes the cotton out of the boll. It does not injure the fibre as is done by hand-picking. The lint on each seed is more or less cleaned, straightened, and laid parallel. This gives the cotton an opportunity to dry and cure properly, and it emerges fluffy, white, and free of all foreign matter such as boll-dirt, leaf, parts of stalk, and sand.

The machine pulls the cotton from the bolls by means of two cylindrical brushes revolving inwardly, and the cotton is combed from these by a cylindrical take-off device.

There are four picking tubes to a machine. Supported overhead by a balance arrangement, the pickers are suspended with such lightness and flexibility that even a child could shift them about with ease. The machine, as it passes through the field, can pick eight rows. A labourer finds no trouble in using it; and in checking up his work it has been found that where he formerly picked 100 lb. by hand he has been picking 400 lb. by machine with only a few days' training. Each machine carries a complete electric power plant. The tractor engine furnishes sufficient electric power to operate the eight motors required to run the machine. The brushes in the leads are driven by a flexible drive-shaft about 3 feet long, which is connected to a small motor suspended about halfway down the suction tube. After the cotton completes its trip through the tube, and just before it drops into the bag, it is given a thorough cleaning, another motor operating a blower as well as supplying the suction power.

We have not seen the above-described machine at work, and therefore what is here stated is necessarily matter supplied by a pamphlet explaining its mechanism and method of picking the cotton. If what is stated in the brochure is correct—and we are not in a position to criticise the statements therein put forward—then the sooner one or two machines are sent by the company to Queensland, to be given a fair trial, the better for the company, should conditions here enable its work to be carried out profitably to the cotton-grower.

BASIC SLAG PROBLEMS.

The "Planter's Chronicle," Cumbatore, India, states that a committee of the Ministry for Agriculture which has been investigating this question obtained returns from steelmakers of their production of slag in 1920, and found that something like only a sixth of the amount of high basic slag turned out before the war is being produced now, and that even this small amount cannot be relied on in the future. There is, however, a larger output of lower grades of slag than in the pre-war period.

The 260,000 tons of high-grade slag of pre-war days contained 9,880,000 units of phosphate.

The 700,000 tons of slag produced in 1920 contained 15,200,000 units, and 560,000 tons out of this quantity, with 13,400,000 units, were of grades containing 15½ per cent. and upwards of phosphates.

It is agreed that practically the whole of the phosphorus entering the ironworks is accounted for in the figures given above. It follows that if the output of steel remains constant, the slag figures will remain substantially as they are, except that the highest grades will tend to become scarcer and the others proportionately to increase.

Dr. E. J. Russell, of Rothamstead, reports that the basic slag produced to-day is very inferior to that produced in 1914, which gave 40 per cent. of phosphates. This is attributed to the changed methods of producing steel. "Open-hearth" basic slag yields only 15 to 30 per cent. of phosphates. Some of it was of the same solubility as that of 1914, and gave proportionate results, but the fluorspar slag produced at present is much less soluble and not so efficient. Dr. Russell does not see much prospect of improvement, for the reason that the slag is worth only a few shillings to the manufacturer while the steel is worth pounds.

In the pre-war days farmers were advised to use only slag of high solubility, and that sold by the best firms had a solubility of 80 per cent. and upwards; but now that the process of manufacture has changed, experts are no longer agreed as to the desirability of a high soluble slag. The latter will come into action sooner than slag of lower solubility, and so a larger return may be expected in the first

season. It is possible, however, that in later seasons the lower-soluble slag may grow in effectiveness, and at the expiration of some years there may be a little difference between the two; this has been considered to be proved by actual experience.

A fertiliser has been put on the market under the name of "Slag phosphate," which is a mixture of low-grade basic slag with Nauru phosphate, ground to a fineness of only 60 to 70 per cent., and sold as containing 45 to 50 per cent., or 50 to 55 per cent., of phosphate of lime, no statement being made by the vendors on the invoices as to their solubility. Actually none dissolves in water in the same manner as the soluble phosphates in superphosphate dissolve, and on testing the mixture called slag phosphate in 2 per cent. citric acid, an analyst found that only $13\frac{1}{2}$ per cent. dissolved, out of a total of 52 per cent. of phosphate. It is evident, therefore, that when submitted to the same laboratory test, high-grade slag is about three times as soluble in citric acid as the slag phosphate. Though this test cannot be taken as a measure of the fertilising value of the two phosphates, it does indicate that phosphate of lime in the slag will often be more quickly effective than that in the mixture.

"Ephos" Phosphate.—A fertiliser sold under this name is a natural phosphate from Egypt, containing 62 per cent. of insoluble phosphate and 20 per cent. of carbonate of lime, with a fineness of 84 per cent. It has been shown from actual experiments to yield results comparable with those obtained from basic slag, but less effective than those obtained from equal quantity of superphosphate, owing to the soluble phosphate content of the latter.

THE HUMAN MACHINE ON THE LAND.

Mr. W. J. Malden, who writes on this subject in "The Journal of the Ministry of Agriculture" (London), is evidently a man who has had large experience in farming and in the training of what he calls "the human machine" for farm work. Following are short extracts from this paper, which appeared *in extenso* in the journal mentioned:—

"It is not necessarily the strongest labourer who does the most work or who is the least tired at the end of the day. Much labour at the present time employed in arable farming is inefficient, and consequently energy is misdirected. Assuming that 100 per cent. represents the efficiency of a labourer of all-round skill, the average for the whole country to-day (in European Britain) is not more than 60 per cent. Something like £100,000,000 is paid yearly in wages. Forty per cent. wasted through inefficiency is a big charge on the land and on the country. When several millions of acres went from the plough in the 'eighties and 'nineties of the last century, and the rural population largely drifted into the towns and industries, the farmers lost a big portion of the highly skilled men and many of their more promising sons. Roughly, £1,000,000,000 was estimated to have gone out of farms and land capital in those years, and a proper wage reward could not be paid to the labourers. The war made a heavy call on the man on the land, and many skilled labourers have, as a result, been lost to the industry.

"Without skilled labour full farming cannot be carried on, but what signs are there that anything is being done to train men to a higher efficiency? Yet the time must come when much of the land will go out of cultivation, unless workmen be endowed with more skill. We are in a fairly mechanical stage on the land, and, doubtless, invention will come further to our aid; but though a percentage of trained mechanics will be required, it seems perfectly safe to state that, in a few years, a highly-skilled farm worker will command very high wages. The skilled man on the land, able to turn to any kind of live stock, good in the hay-time and harvest, a skilled hedger, in fact not lost anywhere, has become a very rare man. If he can do a few of these things really well, he can pretty well make his own terms and he will be in greater demand as years go on.

"In many districts labour has so fallen in skill that farmers have accepted a very low standard, being, in fact, glad of anything that will see them through at all. The farm worker has descended very much from a farm artisan to a farm labourer; he is often possessed of little skill, and, having little joy in his work, cannot take the pleasure in it that his fathers did. Work done in that way becomes drudgery.

"In saying this one makes many exceptions. In all ways, something is needed to bring about better conditions, to give the farm workers a greater interest in their occupation, and to make their lives more valuable to themselves and to others. Interest must be aroused in their work. They should be made skilled so that they may feel an honest pride in their work just as they should in their play.

“FARM LABOUR AS FARM ATHLETICS.

“I have always regarded physical work on the land as farm athletics. This is probably due to the fact that I was reared in a district where work was exceptionally skilled, and where competitions in the arts of husbandry excited as much interest as a local football match does to-day. As a native of Bedfordshire, I was brought up under the direct influence and outcome of those remarkable historic Woburn sheep shearings which began towards the end of the 18th and continued into the 19th century. It was in them that the great effort of the Dukes of Bedford, Coke of Holkham, Ellman of Glynde, and other giants of those days set themselves to wake up farming from the sleep in which it had slumbered for some centuries. These gatherings were notable in that they instituted in a broad manner competitions by workmen in acts of husbandry. These farm workmen's competitions acquired world-wide repute, and before the 19th century opened, a few county agricultural societies were founded, mainly to further skill in farm labour. Naturally from immediate association Bedfordshire inaugurated a society; and until quite late in the century, when hard times in farming stopped them for a few years, the competitions aroused the greatest enthusiasm, and exercised a big influence. Farmers and workmen shared equally in the spirit of emulation aroused, and the county ploughing matches even sixty years ago were the hunting ground where the large agricultural machinery firms sought men of skill and resources to be taken to demonstrate the value of their implements and machines throughout the world. Further, the market gardens and the seed-growing areas in the Biggleswade and Potton district developed men of skill in the handling of tillage tools. Thus, in that and the surrounding counties, arose an all-round skill hard to excel. Skill made work easy to the men, competitions aroused enthusiasm, and enthusiasm led men to work with a will. It was not a question of one man being set apart to do a particular job; every man expected to be an all-round hand.

“SUGGESTED INTER-COUNTY COMPETITIONS.

“There are many men farming successfully to-day who owe their success mainly to taking up farms where their predecessors had trained the men to skilled work. Had they not found them they could not have trained them. It is of little use to find fault with bad work if one cannot show the man the right way. In rather a widely varied life on the land I have found nothing so valuable to me as those few years when I took part in and learned farm work from the skilled artisans amongst whom fate threw me, and every youth going on to the land should make as much study of it as of any other section. I should like to see teams of young farmers of one county challenging those of other counties in a wide range of acts of husbandry; inter-county contests between the farm workmen, with a challenge shield for the best county; and inter-school contests between schools in different districts. It would be far more exhilarating than seeing two parishes playing indifferent football! Few have thought what a lot may be learned in farm work in a village school playground; and how a simple training may teach much that is useful. All sports and physical work should be learnt when one is young.”

(TO BE CONTINUED.)

PROTECTION OF SHEEP FROM BLOWFLIES.—II.

REPORT OF THE SPECIAL BLOWFLY COMMITTEE OF THE INSTITUTE OF SCIENCE AND INDUSTRY.

JETTING.

As is well known, the blowflies generally attack sheep on the breech. So frequently is this the case that it is often taken for granted that if the breech is protected the sheep is protected. In the past some protection was obtained by clipping the wool from around the breech, called “crutching”—an expensive operation, and particularly rough on ewes carrying lambs, and not much protection in a bad fly attack.

Early in the year 1912 the manager of Orion Downs Station, in Queensland, protected the breech by poisoning the wool around it with one of the proprietary arsenical solutions. To get the arsenical solution to penetrate the wool to the skin he forced the solution through a small jet at a fairly high pressure. He thus obtained better protection than with crutching, and at a lower cost. The method

was tried out later at the Government Sheep Experimental Station at Gindie, in Central Queensland, and good results were obtained there.

When the experiments were started by the Institute of Science and Industry Committee, at Dalmally, this method of protection, which through the method of application had come to be called "jetting," was closely investigated. Practically all the specifics on the market were tried, and some of them many times and at different strengths. Only those containing arsenic gave protection, and the protection was found to be proportional to the arsenic present. At the same time, experiments were made by jetting the sheep with a solution of plain commercial white arsenic dissolved in soda ash. It was found that this was not only very much cheaper than any made-up specific, but was easier to work, and gave better protection.

After many hundreds of experiments and jetting many thousands of sheep, we have found, contrary to general belief, that comparatively strong solutions of arsenic not only give the best protection but are absolutely harmless to the sheep or to the quality of the wool. Our experience has since been verified by the use of the process in Queensland by pastoralists on many hundreds of thousands of sheep each year. In our experiments the proportion of arsenic was never taken for granted, even when most carefully made up. A sample of every solution used was invariably sent to the Government Analyst in Brisbane, and the proportion of arsenic was determined by analysis.

On one occasion fifty sheep were jetted with a 1.5 per cent. solution of arsenic, without any symptoms of poisoning showing. Thousands have been jetted with a 1 per cent. solution, and in not a single instance was any harmful result noted. Experimental flocks of sheep, when jetted, were always accompanied in the paddocks by about fifty sheep not treated in any way, so that comparisons might be made as to the protection given.

STRENGTH OF SOLUTION.

As a result of the investigation, we found that a strength of 0.7 per cent. of arsenic gave sufficient protection, but less than that strength only protected for a shorter time.

TIME OF PROTECTION.

In ordinary weather, jetting with a 0.7 per cent. arsenic solution will protect for three months or more, but in very wet weather the arsenic may be washed out more quickly. Reattack, necessitating rejetting in six weeks is the shortest period of protection we have noted.

MAKING UP SOLUTION.

We have found the grey arsenic supplied by the State Government quite pure enough for this work, as it averages about 93 per cent. and is very much cheaper than the ordinary white arsenic. Commercial soda ash dissolves the arsenic readily. To make 100 gallons of solution, the water is boiled and $1\frac{1}{2}$ lb. of soda ash are added. While the water is still boiling, 7 lb. of white arsenic (or $7\frac{1}{2}$ lb. of grey arsenic, to allow for impurities) are added, and the mixture is boiled for twenty minutes. After standing to cool, there should be no sediment if white arsenic is used, and only a slight greyish sediment if grey arsenic is used.

MACHINE.

A pump to deliver the solution at from 60 lb. to 200 lb. pressure per square inch is required. The pump may be run by a special engine or from the shafting of the shearing machinery where that is available. With the pump at the middle of the race, a 30-foot hose will reach each end.

SIZE OF JET OR NOZZLE.

Jets wear quickly where sulphur is used, as it was in many of the earlier experiments with made-up specifics. One-sixteenth of an inch has been found most effective, though, with dense-woolled, full-fleeced sheep, a three-thirty-seconds jet is better.

PRESSURE.

The pressure required varies with the amount and density of the wool and the amount of burr and seed on the surface of the wool. With from four to six months' wool, about 100 to 125 lb. pressure has been found best; and, with a full fleece, about 200 lb.

MAINTENANCE OF PRESSURE.

It is very important to maintain a steady pressure. A large air-chamber is essential, and it must be absolutely free from leaks, so that the gauge will show a steady pressure when jetting sheep after sheep.

AMOUNT TO USE.

About a pint and a-half will be found sufficient for each sheep, the amount varying with the growth of wool.

HANDLING THE SHEEP.

The sheep should be penned in a race about 60 feet long by 2 feet 9 inches wide by 2 feet 9 inches high. The race should be floored with 3-inch round rails, which project about 18 inches to give a working platform. The flooring should have a fall of about an inch and a-half away from the operator to keep the drainage away. The cost of the arsenic solution is so low in this method that it is not essential to catch and again use the small amount of drainage.

TIME TO JET.

If ewes are due to lamb and the fly is not about, jet as close to lambing as is advisable. In other sheep, jet as soon as the fly attack begins. This will stop all infestations, kill innumerable flies, and generally give immunity till that particular fly attack finishes. Up to 3,000 per day can be jetted by four men with a plant such as described above.

COST.

The cost of this method of protection has been found to be very low, the jetting solution, prepared as above, costing about one-fifth of a penny per sheep. Three jettings per annum, therefore, means three-fifths of a penny per head per annum—quite a reasonable cost.

RISKS.

Arsenical solutions are always dangerous. If carelessly made up, when too weak they will give no protection; when too strong they may cause poisoning. With ordinary care in weighing the arsenic and soda and measuring the water, there is no risk of loss. In jetting many thousands of sheep with solutions containing from 0.7 to 1.0 per cent. of arsenic we have not had a single case of poisoning.

OTHER EXPERIENCE.

Many pastoralists have found this method gives good protection. Here is one instance:—Mr. Linton, of Mount Abundance, whose sheep—full-woolled hogget ewes—were badly struck, applied to Mr. Russell, who gave him all information. Mr. Linton used the solution as directed, and on the shearing board, in six weeks, out of 12,000 hoggets, only three were found to be struck, while sheep on surrounding stations were still being attacked.

In regard to the poisoning of flies, we reason thus:—The fly must get rid of her burden of eggs or larvæ. It is mostly the breech which is attacked. If the larvæ are deposited on poisonous wool they cannot thrive. This has been shown conclusively by repeated experiments. Then, instead of deterring the fly from attacking the breech, let us attract her there, or she will attack other parts of the body of the animal. In short, we shall make a fly-trap of every sheep attacked—a cheap and effective trap—for past the poison there are no live larvæ to develop into flies.

PURITY AND GERMINATION OF AGRICULTURAL SEEDS.

By F. F. COLEMAN, Expert under the Pure Seeds Acts.

Under the Pure Seeds Acts the seller must give to the buyer an invoice, stating the kind or kinds of seeds and that such seeds contain no greater amount of foreign ingredients than is prescribed by the Regulations. It therefore follows that every vendor should know the purity and germination of the seeds that he is selling or offering for sale. Without this knowledge he cannot honestly give the required invoice.

A vendor is any person who sells, or offers or exposes for sale, or contracts or agrees to sell, or deliver any seeds. In other words, an Auctioneer, Storekeeper, Produce Merchant, Seedsman, Grower of the seed, or any other persons, are vendors whenever they sell or offer for sale any seeds as seeds for sowing. Section 6 of the Regulations provides for the sale of "As grown" seeds to seed merchants to be cleaned and graded by the merchant before being offered for sale as seed for sowing. The sale by farmers of "As grown" seeds is therefore limited to such merchants as are in possession of one or more efficient seed-cleaning machines. A farmer is a vendor under the Act whenever he sells to another farmer or to any other person, and must give an invoice, as required by the Act. The only exception is the sale of "As grown" seeds to merchants for cleaning and grading.

Every purchaser should know the purity and germination of the seed that he intends to buy or sow; also its freedom from diseased or insect-infested seeds. These matters can only be decided by a thorough examination of a large and truly representative sample drawn from the actual bulk in the sender's possession. Seeds constitute the most variable material that the farmer or merchant purchases, and the success or failure of a crop, or even succeeding crops, may be wholly determined by the kind or condition of the seed sown. No one can afford to leave any doubtful point to chance, and it is but common prudence to ascertain the *purity* and *germination* of all seeds purchased, before sowing or offering them for re-sale.

Both buyers and sellers may send samples to the Department of Agriculture and Stock for analysis. When the information is required for commercial purposes a fee of 2s. 6d. per sample is charged. No charge is made to farmers sending in samples of the seeds that they have purchased for their own sowing, providing the following particulars are plainly written on each sample:—

- (1.) Vendor's name and address.
- (2.) Name of seed.
- (3.) Quantity purchased.
- (4.) Date of delivery.
- (5.) Locality where seed is to be sown.
- (6.) Name and address of purchaser.

If the sender of the sample has not omitted to put his name and address thereon (and hundreds of such samples reach the Department every year), a reply is sent in the form of a report, or certificate, which gives particulars as to the purity and germination of the sample received. Unless the sender is careful to forward a truly representative sample, the reply is valueless. Under no circumstances is it a guarantee of the bulk, but a plain statement of the facts revealed by the analysis of the sample received.

A certificate gives the following particulars:—Percentage of pure seeds, inert matter and weed seeds, ascertained by weight; also the names of the principal weed seeds, and the percentage of dead and non-germinable seeds that the pure seeds contain, ascertained by a germination test; and in the case of such seeds as lucerne and cow peas, the percentage of hard seeds. Hard seeds are seeds with coats so impervious to water as to delay germination. If the amount of hard seeds is more than 10 per cent., it is obvious that the effective germination of the sample is greatly reduced.

The percentage of germination is not given in the certificate, but if the percentage of dead and non-germinable seeds in lucerne amounted to 15 per cent., and the amount of hard seeds to 10 per cent., the germination would be 75 per cent.; in other words, 15 per cent. plus 10 per cent. deducted from 100 leaves 75 per cent. The percentage of purity is the percentage of pure seeds that the sample contains; if a sample contained .7 per cent. of weed seeds and 1.3 per cent. of inert matter, the purity is 98 per cent., as the amount of weed seeds plus the amount of inert matter amounts to .2 per cent., which figure, deducted from 100, leaves 98. The real value of a sample, or the number of pounds of pure germinable seeds that the sample contains, can be arrived at by multiplying the purity by germination and dividing by 100. As an example, we will suppose a farmer purchases 100 lb. of Rhodes grass seed at 1s. 6d. per lb., which on analysis is found to contain $\frac{1}{2}$ of 1 per cent. of weed seeds, and $1\frac{1}{2}$ per cent. of inert matter, and the pure seeds have a germination of 60 per cent., the real value of the seed would be $98 \times 60 \div 100 = 58$ lb. Putting it in another way: the farmer who sows the seed gets a sample containing 58 per cent. by weight of Rhodes grass seed, which under favourable conditions will germinate. Supposing he purchases a similar quantity from another source and received seed with a purity of 43 per cent. and a germination of 13 per cent., the actual value of the seed would be $43 \times 13 \div 100 = 5\frac{1}{2}$ lb. The buyer who purchases 100 lb. of the first sample, at 1s. 6d. per lb., pays £7 10s. for 58 lb. of germinable seed, or 2s. 7d. per lb. for the good seed. With the second sample, at 1s. 6d., he would pay £7 10s. for $5\frac{1}{2}$ lb. of seed, or 27s. 3d. per lb.

It is obvious that the best is cheapest, and quality should be the one and only consideration that determines a purchase.

FOREIGN INGREDIENTS.

Foreign ingredients include dead and non-germinable seeds, hard seeds, diseased or insect-infested seeds, weed seeds, or seeds of any cultivated plant other than that to which the sample purports to belong. Also inert matter, which includes chaff, dust,

stones, or any material other than seeds, and broken seeds less in size than one-half of a complete seed.

The percentage of weed seeds, inert matter, dead and non-germinable seeds, and other foreign ingredients that may be contained in the different kinds of seeds are prescribed by the Regulations, copies of which may be obtained from the Department of Agriculture.

"B" grade seeds are seeds in which the amount of foreign ingredients exceeds the proportion set forth in Schedule A of the Regulations, but does not exceed the proportion set forth in Schedule B, such seeds may be sold as seeds for sowing, providing they are contained in bags or packages to each of which is affixed a label, brand, or stamp, clearly and indelibly marked, specifying: The kind or kinds of such seeds; that the seeds are "B" grade, for planting or sowing, and contain no greater proportion or amount of foreign ingredients than is prescribed; also the name and address of vendor. All invoices relating to such seeds must be distinctly marked "B" Grade Seeds.

INVOICE MUST BE GIVEN BY VENDOR.

On the sale of any seeds of not less value than one shilling the vendor must give to the purchaser an invoice stating that the seeds are for planting or sowing, the kind or kinds of such seeds, and that they contain no greater amount of foreign ingredients than is prescribed.

The actual wording on an invoice should be—

"The seeds mentioned on this invoice are for planting or sowing, and contain no greater proportion or amount of foreign ingredients than is prescribed for such seeds."

WEIGHT OF SAMPLES.

All samples of seed sent for analysis must not be less than the weights herein set out, and in the case of seeds containing foreign ingredients double the weight mentioned should be sent.

Wheat, Oats, Barley, Maize, Rice, Rye, Cowpeas, Tares, Peas,	
Beans	8 oz.
Lucerne, Sweet clover, Sorghum, Sorghum sudanense (Sudan grass), Panicum, Millet, Linseed, Canary, Prairie grass, Buckwheat, Cotton	4 oz.
Rhodes grass, Paspalum dilatatum, Rye grass, Cocksfoot, Couch grass	2 oz.
All agricultural seeds other than those included above	2 oz.

It is of the utmost importance that the samples be drawn by the sender from the seed in his actual possession, care being taken to obtain a small lot from each bag, carefully mixing them together in order to make the sample truly representative of the bulk. All samples must be marked with name of seed, quantity it represents, marks (if any), and last, but not least, the name and address of the sender. Unless these particulars are plainly written on the sample delay will ensue. A covering letter should be mailed advising of the despatch of the samples, and enclosing the fees, if such are payable.

Although buyers and sellers are able to form a good idea of the market value or price, experience shows that they are frequently misled as regards purity and germination. It is impossible to determine the amount of weed seeds, non-germinable seeds, hard seeds, or inert matter other than by a purity analysis and germination test conducted under uniform scientific methods. Any opinion as to the quality or condition of any agricultural seeds is useless unless based on the examination of a truly representative sample. This work is undertaken by the Seed Laboratory of the Department of Agriculture.

Before sending any samples, care should be taken to see that the required particulars are plainly written thereon in ink.

COVERING LETTER.

All samples with *covering letter*, should be addressed to—

The Under Secretary,

Department of Agriculture and Stock,
Brisbane.

SEED MAIZE FOR SALE.*

To growers desirous of obtaining a pure and reliable strain of improved seed, the following varieties are being offered and represent limited stocks raised from selected strains of Departmental seed:—

Yellow.—

Eureka Yellow Dent.
Reid's Yellow Dent.
Funk's Yellow Dent.
Improved Yellow Dent.
Funk's 90-Day.
Golden Beauty.
Star Leaming.

Red—

Red Hogan.

CONDITIONS OF SALE.

Applications for seed, with accompanying remittance (exchange added), should be addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane. Postal address and name of Railway Station should be given.

Advice will be sent when seed is despatched.

Purchasers are requested to write promptly after receipt of seed, should any matters require adjustment.

Should the variety asked for be out of stock, the Department may substitute another variety unless the applicant indicates a desire to the contrary.

PRICES.

To enable applicants living at a distance to benefit, a flat rate of 12s. 6d. per bushel is being charged. This price includes all railage to the nearest railway station, but, where steamer freight is necessary, this and any charges in relation thereto must be paid by the purchaser and the cost thereof added to the remittance.

DESCRIPTION OF VARIETIES.

Eureka Yellow Dent.—Recently imported by the Department of Agriculture, and has given very satisfactory results. It is a fairly short-growing, quick-maturing variety, taking about four months to mature. The ears are situated low on the stalk, are weighty, of medium length, and carry from sixteen to eighteen rows of very tightly packed, amber-coloured, slightly pointed grain, having a rich yellow cap and rough crease dent.

Reid's Yellow Dent.—Moderately tall-growing, medium-early variety—four months. The ears are cylindrical in shape, of good size, carrying from eighteen to twenty tightly packed rows of medium-sized, slightly pointed, wedge-shaped grain, which is of a golden colour, with dark amber base and slightly rough crease dent. The stalks are light and leafy. It is suitable for the production of early crops, or for districts where there is a short growing season. It is also a good fodder corn.

Funk's Yellow Dent.—Medium-early variety of moderately tall growth, taking about four months to mature. The ears are of a good size, and cylindrical in shape, with sixteen to twenty tightly packed rows of grain. The grain is of medium size, with square shoulders, and is thick-bodied, with a characteristic crease dent; is light amber in colour, with a cream-coloured cap. The husk covering is fair. Like Reid's, it is suited for early crops, or districts which have a short growing season. It is a very hardy variety, a good yielder, and also a good fodder corn.

Improved Yellow Dent.—A tall-growing, late-maturing variety—five to five and a-half months. The ears are cylindrical in shape, carrying sixteen to eighteen tightly packed rows. The grain is deep, wedge-shaped, of rich amber colour, with a yellow tip cap and rough crease dent. It is suitable for coastal districts and scrub lands where there is a good rainfall. It is capable of giving heavy yields of grain and fodder. Special strains of this seed have yielded over 100 bushels per acre under field conditions.

Funk's 90-Day.—This is a recent importation of special seed maize, and was propagated by the Department of Agriculture for the purpose of bringing the variety into cultivation, as a high-yielding, reliable type of maize of this description is required to meet the existent demand. As the name implies, it is a very early-maturing variety. The ears are cylindrical in shape, with fourteen to sixteen very

* All previous lists are cancelled.

closely packed rows of grain. The grain is plump, of good depth, and slightly pointed; it has an amber-coloured base, with a rich yellow cap and crease dent.

Golden Beauty.—This variety is a tall-growing, medium-late variety—four and a-half to five months. The ears are long, with very small core, and usually twelve rows of grain. The husk covering is good. The grain is flat, of medium depth, with slightly rounded shoulders; bright amber in colour, with cream-coloured cap and long crease dent. It has a very high shelling percentage, is a very hardy variety, and a splendid yielder. It is also a good fodder corn.

Star Leaming.—This is a fairly short-growing, medium-early variety, taking about four months to mature. Ears carry from sixteen to twenty rows of grain, are borne fairly low on the stem, and are weighty and very compact. The grain is of medium size and blunt-wedge shape; bright amber in colour, with a distinct yellow cap and a rough crease dent. It is one of the best of the early varieties; is very suitable for early or catch crops, a heavy yielder, and a very popular variety.

Red Hogan.—This variety is a fairly tall-growing, late-maturing variety—five to five and a-half months. The ears are large, with usually sixteen rows of well-packed grain. The husk covering is good. The grain is very deep, wedge-shaped, from reddish yellow to light red in colour, with a distinct yellow cap and a rough crease dent. It is a favourite high-yielding variety, well adapted for rich alluvial soils, and suitable for districts with a good rainfall.

HORTICULTURAL NOTES.

By E. W. BICK, Curator, Botanic Gardens.

Some very seasonable weather has been experienced recently. The cold nights have had an appreciably good effect on insect pests, by keeping them within bounds. They are not nearly so prevalent as in what may be termed a very mild winter similar to that experienced last year. The showers of the past few weeks have also been beneficial. The moisture at this time of year, being slow of evaporation, lasts much longer than in summer, and encourages good winter growth. Cinerarias are better than usual, and will require feeding with liquid manure or fertiliser to obtain the best results. Keep them moving, and keep a keen lookout for insect pests such as caterpillars and aphids. Both these attack the plants from the under-side of leaves, where only a few are grown. A rubber or tin puff "ball" is a good thing to use in their extermination. Fill it with insecticide powder or powdered tobacco dust—the old-fashioned snuff does capitally—and blow it over the under-side of leaves; or a strong tobacco-water spray may be used with good effect.

Rose planting should be finished as soon as possible. Keep the newly-planted ones moist, and don't allow the soil around plants to become dry and caked. The surface should be kept broken up. This is a good time to put in cuttings of shrubs such as hibiscus, acalyphas, lagerstroemias, as well as frangipani, and towards the end of the month poinsettias and bougainvillea cuttings may be put in, when the plants go out of flower. Choose good strong well-ripened wood for cuttings, placing them well in the ground. At least two-thirds of the cutting should be in the soil. A fine effect may be obtained with the brick-red *Bougainvillea laterita*, or the pink one (*B. rosca*). When grown as hedges they can be kept trimmed, and with proper attention they will flower profusely. Should any tree-planting be contemplated, get them in as soon as possible, and remember that they will well repay good preparation of soil. Do not plant in a little pot-hole barely large enough to get the plant in as it comes out of the pot, but break up the ground thoroughly, and don't forget that many of the native trees, such as crow's ash, flame tree, wheel of fire, *Barklya syringifolia*, and silver wattle are far better than many of those trees often planted. Get away from the camphor laurel habit, and plant something useful as well as ornamental in small gardens.

Bourvardias were often seen in gardens some years ago, but their cultivation has apparently lapsed somewhat. They are beautiful flowers, and well worth a little trouble. They delight in a rich, free, well-drained soil and a rather sheltered situation, where they would not get much of the afternoon sun, for preference. They are very free-flowering and may be obtained in about a dozen varieties of white and pink, both single and double flowers, and are particularly suitable for small gardens.

A start may now be made with the sowing of seeds of summer flowering annuals, such as aster, amaranthus, celosias, calliopsis, coreopsis, elianthus, petunias, nicotiana, sunflowers, and zinnias.

RIPENING BANANAS IN AIR-TIGHT CHAMBERS.

The following information was recently supplied by Mr. A. H. Benson, Director of Fruit Culture, to inquiries received by him on this subject:—"The chambers used for ripening bananas in Brisbane are usually about 6 feet by 6 feet by 6 feet, and are made of the best quality tongued and grooved inch pine. They are usually fitted inside with two shelves, so that three tiers of bananas can be treated at once—namely, one on the floor and one on each shelf. A chamber of this size will hold from 100 to 130 bunches according to size. The heat is obtained from a gas-ring or an oil stove. The temperature is raised to about 85 degs. Fahr. This will take about six hours, but the exact time depends on the temperature of the fruit and on that of the outside air. Once the fruit has been raised to 85 degs. the period of ripening can be regulated so that if desirable the fruit can be brought out quicker or delayed according to the raising or lowering of the temperature.

"No heat is used during the summer months, the fruit is simply stacked in an air-tight chamber."

GRAPE CULTURE IN QUEENSLAND.

By ALBERT H. BENSON, M.R.A.C., Director of Fruit Culture.

PART III.

PRUNING THE VINE.

Pruning is one of the most important vineyard operations, and one that requires not only a thorough knowledge of the different habits of growth of the many varieties of grapes but also the possession of considerable mechanical skill or dexterity in the actual performance of the work itself.

The work of pruning is best done by means of a pair of secateurs and a suitable pruning-saw. The former should be strongly made and possess a well tempered cutting blade that can be kept very sharp and that is capable of cleanly severing wood up to 1 inch in diameter. Anything larger will require a saw. Pruning is necessary, in the first place, to shape the vines so that the vineyard can be worked to the best advantage; and, in the second place, in order to provide an annual supply of new fruiting wood. The wood on which the fruit is borne is produced from wood of the previous season's growth, which in its turn was produced from still older wood; so that it will be seen that there must be wood of at least three different season's growth on the vine before it will bear fruit. In starting a vineyard, therefore, the first pruning is that required to shape the vine so that it can be given the form it is to permanently assume, no matter whether it is to be grown as a bush or on a trellis. All vines are started in a similar manner, their subsequent treatment depending on the form they are to permanently assume, and on the particular type of pruning to which they are best adapted. When a vine is grown from a cutting, as previously described, it is allowed to make all the growth it can during the first year, and is not interfered with in any way. The cuttings will not, however, all make the same amount of growth. In some the growth may be several feet in length, whereas in others it may only be an inch or two; but no matter how strong or weak the growth is it must all be cut away at the first winter pruning except one cane, which is cut back to not more than two buds, from which the following season's growth will be produced.

The following illustrations, which have been taken from the first edition of Wickson's "Californian Fruits" and redrawn by the Department's artist, will enable a beginner to see exactly how to prune a one-year-old vine. Fig. 1, represents a good growth; figs. 2 and 3, a medium growth; and fig. 4 a poor growth.

In these figures, *d* represents the top of the original cutting which was planted with two buds above the surface of the ground; *a* is the lowest shoot of each cutting, and in Figs. 1, 2, and 3 it should be cut back to two buds and all other shoots removed. In Fig. 4, shoot *b* is removed and shoot *a* allowed to remain as it is, and should be cut back the next season.

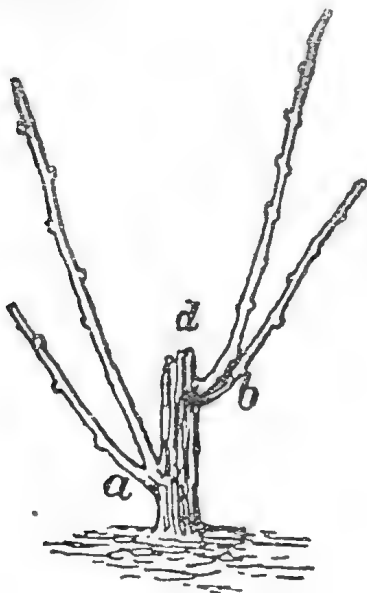


FIG. 1.

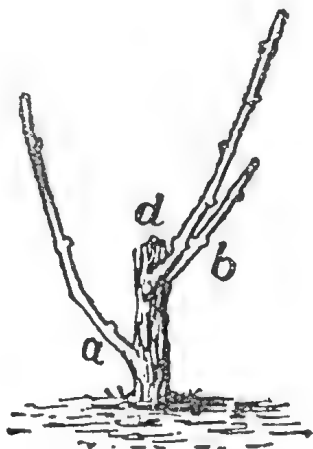


FIG. 2.

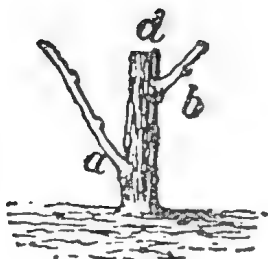


FIG. 3.

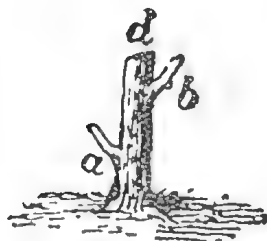


FIG. 4.

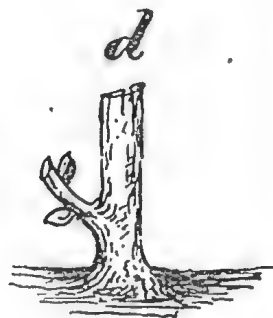


FIG. 5.

Fig. 5 shows the vine in Figs. 1, 2, and 3 when pruned (first winter pruning). From this stage the future treatment of the vine depends on whether it is to be grown as a bush or on a trellis.

In the case of the first, the vine as pruned in Fig. 5 should throw out three or more strong canes during the second season, and in order to keep these canes from spreading all over the ground they should be tied to a strong stake that has been provided for this purpose.

This stake should be not less than 2 in. square, and about 5½ ft long. It should be set at least 1 ft. in the soil, and should be made of durable hardwood. In the western districts, where white ants are troublesome, it should be made of cypress pine.

The vine should be allowed to make all the wood it can during its second season's growth, and the following winter it should consist of

two or three main canes with more or less lateral growth. Fig. 6 shows a growth of three shoots without laterals, and of these the best and straightest *a* is to be retained to form the future trunk of the vine, and *b* and *c* are to be cut clean away.

The cane *a* is then cut back (second winter pruning) to the height at which it is desired to form the head of the vine, which in the case of raisin grapes grown in a hot and dry district should not be more than 8 in. to 10 in. from the ground. In other cases the height should be from 12 in. to 18 in. from the ground, measured from the second bud from the top—not from the top bud—as the second bud fixes the height of the trunk.

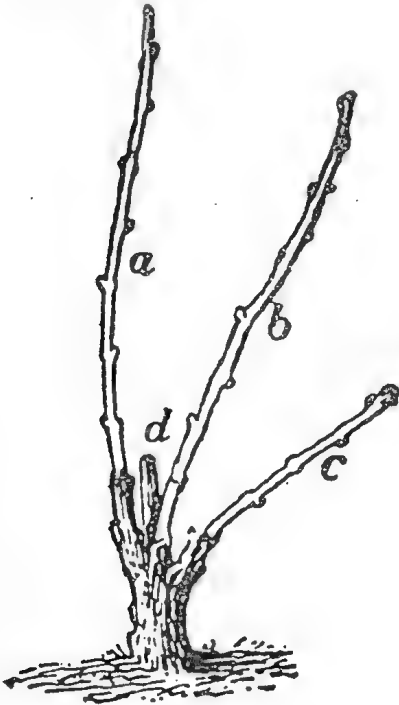


FIG. 6.



FIG. 7.

Fig. 7 shows the vine when pruned. In order to produce a clean trunk, free from scars, all the buds other than the three top ones should be rubbed out, and these three buds will throw out strong fruit-bearing canes.

A low-headed vine, such as that met with in the raisin vineyards of California, is not staked; and, excepting in our driest and hottest districts, this method of training is unsuited to our climate, as we never know what rain we are going to get during the ripening period. Consequently bush pruning, in which the young canes are tied to a permanent stake, is to be preferred, as the wood and fruit is kept off the ground and is thus less likely to be injured by rain.

The three strongest canes produced from the three top buds of the vine, as shown in Fig. 7, are allowed to grow till they are 2 ft. or a little more in length, when the tip is pinched back in order to develop lateral growth that will tend to shade the fruit. The three main canes are tied to the stake in order to keep them in place.

At the third winter pruning, the vines will have made a growth somewhat similar to that shown in Fig. 8, and all the growth except two

or three strong main canes is cut away, and these main canes are cut back to two eyes. Fig. 9 (third winter pruning) shows a vine pruned back to two canes, on which two eyes have been left in each, but in the case of a strong-growing vine three canes cut to two eyes each could be left. The vine when pruned shows the height of the permanent trunk, and the pruning from this on is a simple matter. All that is necessary is to take care that the vine is not allowed to carry more canes than it is able to support, and which are capable of producing good bunches of fruit. The exact number of canes to be left will depend entirely on the strength and vigour of the individual vine, and is a matter that must be left to the discretion of the vigneron. Generally speaking, if a vine is found to be making a poor growth the number of canes is reduced, and when the growth is excessive more canes are allowed to remain.

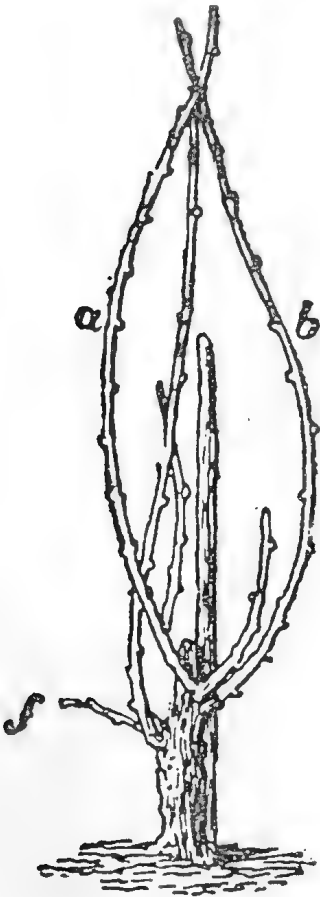


FIG. 8.

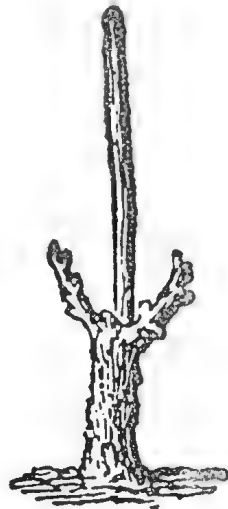


FIG. 9.

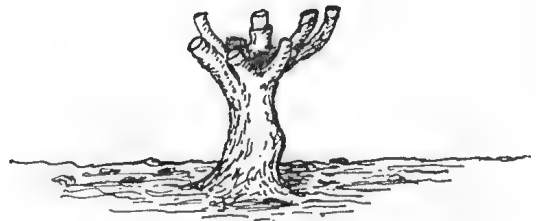


FIG. 10.

In bush-pruned vines there is frequently a tendency to allow the head of the vine to become very straggling, and to possess a number of arms more or less covered with the scars of previous years' prunings, and the bearing-wood of which is a considerable distance from the main trunk. This is a serious fault, as the straggling arms are always a serious source of danger to the health of the vine, as they tend to form a shelter for the spores of the various fungi by which the grape vine is attacked, as well as a harbour for many insects and their eggs. In

addition, the nearer the bearing-wood is to the main trunk of the vine the better the fruit, consequently it is necessary, both for the sake of the health of the vine and also for the production of first-class fruit, to see that the head of the vine is kept as compact as possible. This is done by always cutting back to the cane nearest to the main trunk and shortening back the new growth every year as far as possible. In addition to this, when the growth cannot be reduced otherwise, a shoot should be allowed to develop from or near to the original head of the vine, and this shoot should when cut back the following season produce a cane to take the place of the straggling arm, which is to be cut clean away. By using care the head of the vine can be kept within reasonable limits and old wood that has outlived its usefulness can be removed and replaced by new and more vigorous growths.

As some vines do not fruit well when short-pruned—that is, when only two eyes are left—it is necessary in their case to somewhat modify this method of pruning when the vine is grown as a bush, and this is done by leaving two or more canes of the previous season's growth from 2 to 3 ft. long, as well as an equal number of canes pruned to two eyes to produce canes on which to grow the fruit the following season. This is known as the rod and spur system of pruning, in which the fruiting cane is cut away once it has borne fruit and a new cane that has been grown from a spur takes its place, only to be replaced in its turn. This system of pruning is used both in the case of vines grown as a bush and also when they are grown on a trellis, and will be described more fully when dealing with trellised vines.

Figure 10, which is reproduced from Mr. C. Ross's pamphlet, gives a good idea of a well-grown and properly pruned bush vine in full bearing.

TRELLISED VINES.

As the pruning of trellised vines is well described and illustrated in Mr. Ross's work, to which I have previously referred, I am reproducing a considerable portion of his pamphlet that deals with this matter, as I agree with him that the unilateral cordon or long rod with spurs or "Royat" is not only the simplest method of trellising vines, but is the one that is best adapted to our local conditions. It consists of one long permanent rod, which can either be spur-pruned by cutting back the canes annually to two eyes, or it can be pruned so that long fruiting canes and short spurs are left (Casanave cordon).

The first season's growth from the cutting is pruned as in Fig. 5, and should eventually produce a growth similar to Fig. 11. By judicious pinching and stopping of laterals and other shoots not required, one long strong cane will be produced by the end of summer (Fig. 11 at A). At the subsequent winter pruning all the side shoots are cut clean off, leaving only the one rod. The vines being planted 7 ft. apart, this cane should be pruned back to a little short of that length and tied down to the bottom wire of the trellis with a graceful curve. (See Fig. 12.) The bottom wire should be about 18 inches from the ground. The following winter this cane becomes a permanent rod with canes (see Fig. 13); each of these canes is then pruned to two eyes, as in Fig. 14. All spring and summer shoots arising from the neck of the vines and underside of the rod must be rigorously suppressed. The curves in Figs. 13 and 14 are too sharp and have caused the strong growth at B, which should have been rubbed off on its first appearance.

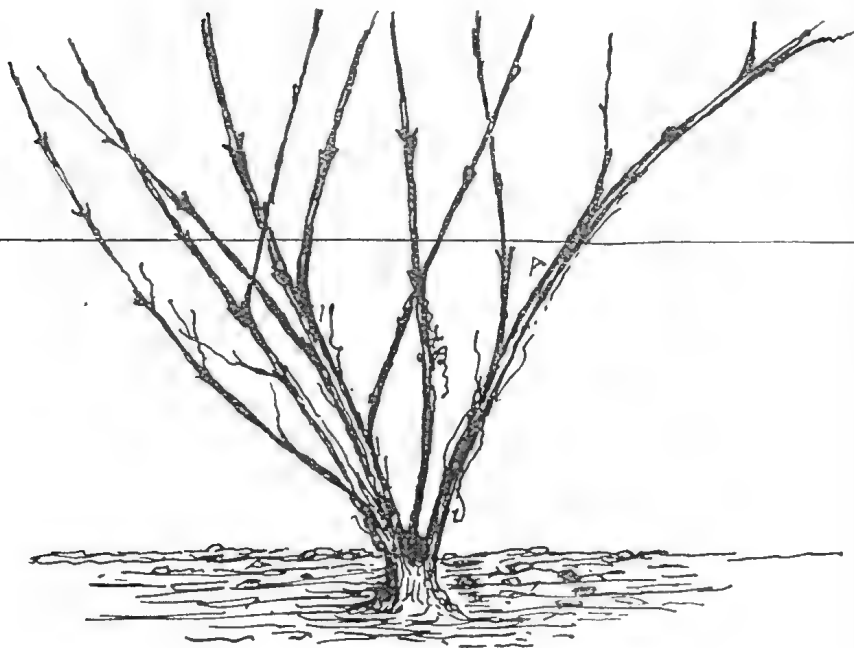


FIG. 11.

The first spur on the rod should not be less than 12 inches from a vertical line of the base (Fig. 12). At the succeeding pruning it will be

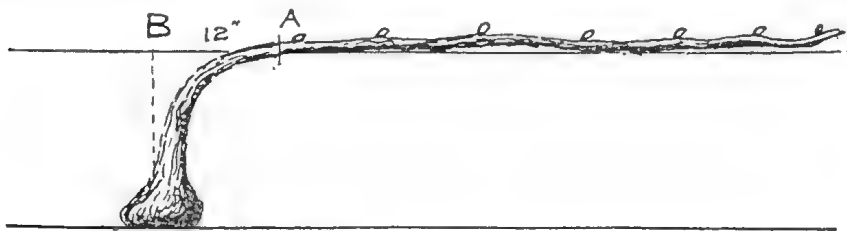


FIG. 12:

found that most of the spurs will have put forth two canes (Fig. 15); the top cane should be cut out close to the lower one, and the remaining cane pruned to two eyes (Fig. 16). Should only one cane have issued from a node, it must be pruned to two eyes. The last spur on the rod is treated differently. Of the two canes issuing therefrom, the upper one is pruned to several eyes and tied down to meet the first spur of the next vine (Fig. 16). This is called the annual terminal fruit branch, with return spur beneath, and acts as a safety valve to the superfluous sap flow, as well as a protection to the neck of the adjoining vine. The lower cane is pruned to two eyes, forming a return spur, and will furnish two canes for the following season, to be treated in the same manner. The terminal fruit branch is only an annual expedient, which is pruned off at each winter pruning and is again reproduced from the upper cane of the return spur left for the purpose.

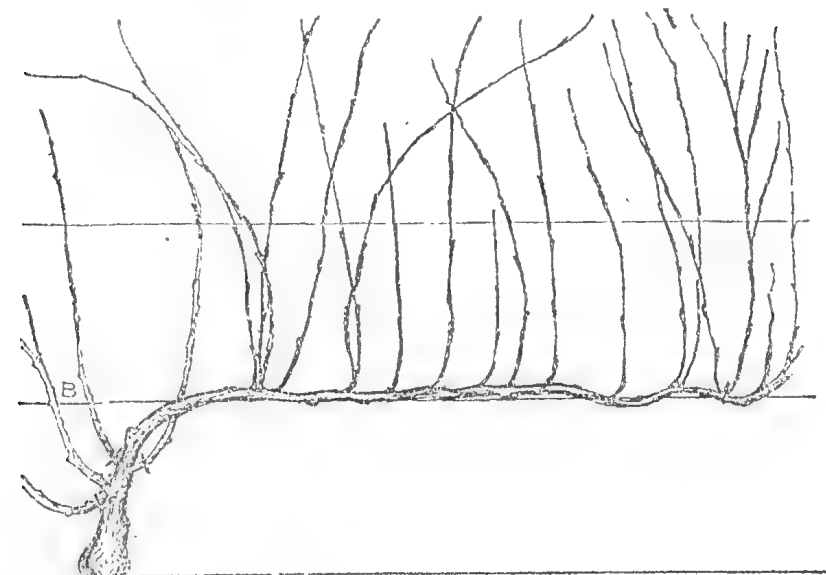


FIG. 13.

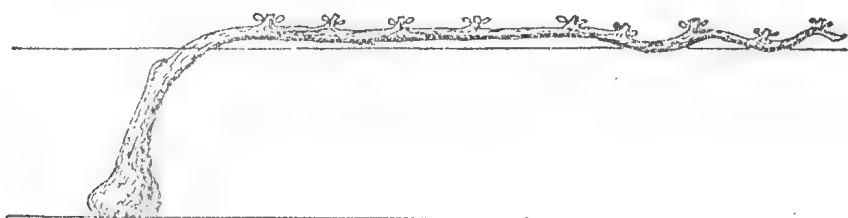


FIG. 14.

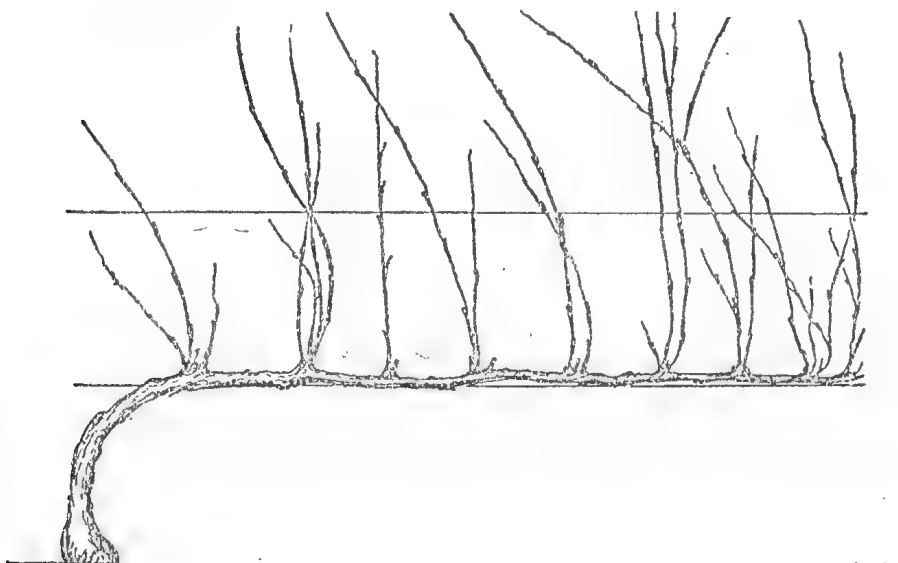


FIG. 15.

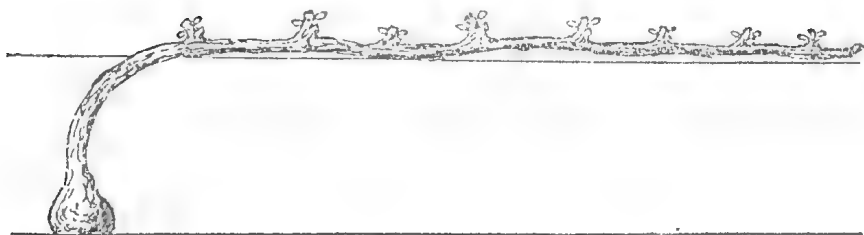


FIG. 16.

THOMERY SPALIER OR BI-LATERAL CORDON.

This is a two-armed vine, and is formed as follows:—

An upright shoot arising from a young vine in spring is pinched back before approaching the bottom wire. Several laterals will eventually push forth; the top one is allowed to grow, whilst others beneath may be pinched back at their first leaf. The lower laterals are not required except for the purpose of elaborating sap to strengthen the main stem. The following winter the cane that has been allowed to grow is pruned back to two eyes.

Several shoots may issue from this point during the following spring, and two of these should be selected and trained along the wire, one on each side, as main arms or permanent rods. Other shoots are rubbed out. At the next pruning the rods are shortened to meet those of the neighbouring vine. The canes issuing from the nodes of these two rods are pruned to two eyes as in the Royat system.

LONG PRUNING.

THE BORDELAISE SPALIER.

This is an excellent system for strong growing vines.

Select a young vine which has been pruned to two spurs. The following spring several canes will issue from these two spurs. At the subsequent pruning the upper cane, or the one situated furthest from the base of each spur, is then bent down to the wire and shortened to six, eight, ten, or more eyes, and the return spurs nearer the base are pruned to two eyes. The return spurs may produce fruit, but their chief function is to provide canes and spurs to replace the annual fruit canes already tied down, and which are completely cut out after producing their one crop. As will be observed, the object of this method is to provide new fruit rods and spurs for every year's crop.

THE CASANAVE CORDON.

The vine is pruned as a unilateral cordon. After the permanent rod has been laid down, short pruning is followed until it arrives at the stage shown in Fig. 15. The upper cane at each spur is now shortened and tied down, and the return spur pruned to two eyes. Where only one cane occurs, it should be pruned to two eyes.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR JUNE, 1922.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Hedges Nattie ...	Friesian ...	20 May, 1922	900	4.0	42.00	
Prim ...	" ...	6 Feb., "	1,110	3.2	41.40	
College Cold Iron ...	Jersey ...	25 Jan., "	600	5.8	41.10	
Gay Lassie ...	Ayrshire ...	20 Feb., "	660	5.0	39	
Miss Fearless ...	" ...	30 May, "	780	3.5	31.80	
Little Buttercup ...	Friesian ...	12 Dec., 1921	750	3.6	31.50	
College Prima Donna	" ...	17 Nov., "	630	4.3	31.50	
Dawn of Warragaburra	Jersey ...	17 May, 1922	540	4.9	31.20	
Snowflake ...	Shorthorn ...	20 Feb., "	600	4.1	28.80	
Skylark ...	Ayrshire ...	7 Feb., "	540	4.5	28.50	
College Ma Petite	Jersey ...	5 Feb., 1922	450	5.0	28.40	
Auntie's Lass ...	Ayrshire ...	31 Oct., 1921	510	4.6	27.60	
Rosine ...	" ...	18 May, 1922	540	4.3	27.00	
Magnet's Leda ...	Jersey ...	8 Feb., "	450	5.1	27.00	
Dear Lassie ...	Ayrshire ...	19 June, "	504	4.4	25.92	
College Evening Glow	Jersey ...	11 Oct., 1921	360	6.0	25.50	
Confidante ...	Ayrshire ...	8 May, 1922	450	4.7	24.60	
Miss Betty ...	Jersey ...	17 May, "	420	4.9	24.30	
College Nita ...	Friesian ...	26 Feb., "	540	3.8	24.00	
College Cobalt ...	Jersey ...	3 April, "	420	4.8	23.70	
College Promise ...	" ...	6 Jan., "	390	5.0	22.80	
College Wildflower	" ...	10 Dec., 1921	390	5.0	22.80	
Lute ...	Ayrshire ...	8 Jan., 1922	540	3.6	22.50	
Sheila of Nundorah	Guernsey ...	16 April, "	390	4.9	22.50	
Lady Mitchell ...	Friesian ...	20 Dec., 1921	450	4.1	21.60	
College Bluebell ...	Jersey ...	22 Oct., "	360	5.1	21.60	
College Grandeur	" ...	22 May, 1922	320	5.7	21.20	
Lilia ...	Ayrshire ...	3 Mar., "	360	4.9	20.70	
Buttercup ...	Shorthorn ...	28 Oct., 1921	480	3.6	20.10	

Rainfall for the period, 103 points.

THE MYSTERY OF "ROARING RAILS."

On many of the railway systems of the world the phenomenon of "roaring rails" has been a too-familiar trouble to engineers. The surface of the rails developed ridges at regular distances of an inch or so, and these corrugations led to excessive noise and vibrations. On electric tramway systems the same trouble appeared in ever greater degree; frequently the noise was so excessive that the rails had to be ground flat at great expense—only to reveal fresh corrugations as soon as the traffic was resumed. All sorts of explanations were offered and for a long time the precise cause of the trouble remained a mystery. Now the problem has been settled by a series of experiments carried out by a committee of British experts on a tramway subway in London, where the rails and track could be altered freely so as to test the various explanations put forward. The conclusion reached is that vibration has nothing to do with the case, and that the real cause lies in the action of a very heavily loaded wheel running along the rail. This action makes the material of the rail surface "flow" into waves or corrugations very much as an ordinary road surface flows into waves under the action of a steam roller. The remedy therefore lies in the use of harder rails and, where possible, of larger wheels.—"Industrial Publicity Service," London.

TABLE OF CANE VALUES.

Under 1922 Cane Prices Boards Awards. Calculated to the nearest $\frac{1}{4}$ d. When raw sugar is £30 6s. 8d. per ton; base price £2 2s. for 12 c.c.s. On receipt of c.c.s. returns from the mill, farmers will, by a glance at this table, be able to see exactly the value of their cane per ton with sugar at £30 6s. 8d. for 94 n.t.

c.c.s.	£ s. d.	c.c.s.	£ s. d.	c.c.s.	£ s. d.	c.c.s.	£ s. d.
7-0	0 15 3	10-0	1 12 6	13-0	2 6 9	16-0	3 1 0
-05	0 15 6 $\frac{1}{2}$	-05	1 12 8 $\frac{3}{4}$	-05	2 6 11 $\frac{3}{4}$	-05	3 1 2 $\frac{3}{4}$
-1	0 15 10	-1	1 12 11 $\frac{3}{4}$	-1	2 7 2 $\frac{3}{4}$	-1	3 1 5 $\frac{3}{4}$
-15	0 16 1 $\frac{1}{4}$	-15	1 13 2 $\frac{1}{4}$	-15	2 7 5 $\frac{1}{2}$	-15	3 1 8 $\frac{1}{2}$
-2	0 16 4 $\frac{3}{4}$	-2	1 13 5 $\frac{1}{4}$	-2	2 7 8 $\frac{1}{2}$	-2	3 1 11 $\frac{1}{2}$
-25	0 16 8 $\frac{1}{4}$	-25	1 13 8 $\frac{1}{4}$	-25	2 7 11 $\frac{1}{4}$	-25	3 2 2 $\frac{1}{4}$
-3	0 16 11 $\frac{3}{4}$	-3	1 13 11	-3	2 8 2	-3	3 2 5
-35	0 17 3 $\frac{1}{4}$	-35	1 14 2	-35	2 8 5	-35	3 2 8
-4	0 17 6 $\frac{1}{2}$	-4	1 14 4 $\frac{3}{4}$	-4	2 8 7 $\frac{3}{4}$	-4	3 2 10 $\frac{3}{4}$
-45	0 17 10	-45	1 14 7 $\frac{3}{4}$	-45	2 8 10 $\frac{3}{4}$	-45	3 3 1 $\frac{3}{4}$
-5	0 18 1 $\frac{1}{2}$	-5	1 14 10 $\frac{1}{2}$	-5	2 9 1 $\frac{1}{2}$	-5	3 3 4 $\frac{1}{2}$
-55	0 18 5	-55	1 15 1 $\frac{1}{4}$	-55	2 9 1 $\frac{1}{4}$	-55	3 3 7 $\frac{1}{4}$
-6	0 18 8 $\frac{1}{2}$	-6	1 15 4 $\frac{1}{4}$	-6	2 9 7 $\frac{1}{4}$	-6	3 3 10 $\frac{1}{4}$
-65	0 18 11 $\frac{3}{4}$	-65	1 15 7	-65	2 9 10	-65	3 4 1
-7	0 19 3 $\frac{1}{4}$	-7	1 15 10	-7	2 10 1	-7	3 4 4
-75	0 19 6 $\frac{3}{4}$	-75	1 16 0 $\frac{3}{4}$	-75	2 10 3 $\frac{3}{4}$	-75	3 4 6 $\frac{3}{4}$
-8	0 19 10 $\frac{1}{4}$	-8	1 16 3 $\frac{1}{2}$	-8	2 10 6 $\frac{1}{2}$	-8	3 4 9 $\frac{1}{2}$
-85	1 0 1 $\frac{3}{4}$	-85	1 16 6 $\frac{1}{2}$	-85	2 10 9 $\frac{1}{2}$	-85	3 5 0 $\frac{1}{2}$
-9	1 0 5	-9	1 16 9 $\frac{1}{2}$	-9	2 11 0 $\frac{1}{2}$	-9	3 5 3 $\frac{1}{2}$
-95	1 0 8 $\frac{1}{2}$	-95	1 17 0 $\frac{1}{2}$	-95	2 11 3 $\frac{1}{4}$	-95	3 5 6 $\frac{1}{4}$
8-0	1 1 0	11-0	1 17 3	14-0	2 11 6	17-0	3 5 9
-05	1 1 3 $\frac{1}{2}$	-05	1 17 5 $\frac{1}{2}$	-05	2 11 8 $\frac{3}{4}$	-05	3 5 11 $\frac{3}{4}$
-1	1 1 7	-1	1 17 8 $\frac{3}{4}$	-1	2 11 11 $\frac{3}{4}$	-1	3 6 2 $\frac{3}{4}$
-15	1 1 10 $\frac{1}{4}$	-15	1 17 11 $\frac{1}{4}$	-15	2 12 2 $\frac{1}{2}$	-15	3 6 5 $\frac{1}{2}$
-2	1 2 1 $\frac{3}{4}$	-2	1 18 2 $\frac{1}{2}$	-2	2 12 5 $\frac{1}{2}$	-2	3 6 8 $\frac{1}{2}$
-25	1 2 5 $\frac{1}{4}$	-25	1 18 5 $\frac{1}{4}$	-25	2 12 8 $\frac{1}{4}$	-25	3 6 11 $\frac{1}{4}$
-3	1 2 8 $\frac{3}{4}$	-3	1 18 8	-3	2 12 11	-3	3 7 2
-35	1 3 0 $\frac{1}{4}$	-35	1 18 11	-35	2 13 2	-35	3 7 5
-4	1 3 3 $\frac{1}{2}$	-4	1 19 1 $\frac{3}{4}$	-4	2 13 4 $\frac{3}{4}$	-4	3 7 7 $\frac{3}{4}$
-45	1 3 7	-45	1 19 4 $\frac{3}{4}$	-45	2 13 7 $\frac{3}{4}$	-45	3 7 10 $\frac{3}{4}$
-5	1 3 10 $\frac{1}{2}$	-5	1 19 7 $\frac{1}{2}$	-5	2 13 10 $\frac{1}{2}$	-5	3 8 1 $\frac{1}{2}$
-55	1 4 2	-55	1 19 10 $\frac{1}{2}$	-55	2 14 1 $\frac{1}{4}$	-55	3 8 4 $\frac{1}{4}$
-6	1 4 5 $\frac{1}{2}$	-6	2 0 1 $\frac{1}{4}$	-6	2 14 4 $\frac{1}{4}$	-6	3 8 7 $\frac{1}{4}$
-65	1 4 8 $\frac{3}{4}$	-65	2 0 4	-65	2 14 7	-65	3 8 10
-7	1 5 0 $\frac{1}{4}$	-7	2 0 7	-7	2 14 10	-7	3 9 1
-75	1 5 3 $\frac{3}{4}$	-75	2 0 9 $\frac{3}{4}$	-75	2 15 0 $\frac{3}{4}$	-75	3 9 3 $\frac{3}{4}$
-8	1 5 7 $\frac{1}{4}$	-8	2 1 0 $\frac{3}{4}$	-8	2 15 3 $\frac{1}{4}$	-8	3 9 6 $\frac{1}{4}$
-85	1 5 10 $\frac{3}{4}$	-85	2 1 3 $\frac{1}{2}$	-85	2 15 6 $\frac{1}{2}$	-85	3 9 9 $\frac{1}{2}$
-9	1 6 2	-9	2 1 6 $\frac{1}{2}$	-9	2 15 9 $\frac{1}{2}$	-9	3 10 9 $\frac{1}{4}$
-95	1 6 5 $\frac{1}{2}$	-95	2 1 9 $\frac{1}{4}$	-95	2 16 0 $\frac{1}{4}$	-95	3 10 3 $\frac{1}{4}$
9-0	1 6 9	12-0	2 2 0	15-0	2 16 3	18-0	3 10 6
-05	1 7 0 $\frac{1}{2}$	-05	2 2 2 $\frac{3}{4}$	-05	2 16 5 $\frac{3}{4}$	-05	3 10 8 $\frac{3}{4}$
-1	1 7 4	-1	2 2 5 $\frac{3}{4}$	-1	2 16 8 $\frac{3}{4}$	-1	3 10 11 $\frac{3}{4}$
-15	1 7 7 $\frac{1}{4}$	-15	2 2 8 $\frac{1}{4}$	-15	2 16 11 $\frac{1}{4}$	-15	3 11 2 $\frac{1}{4}$
-2	1 7 10 $\frac{1}{4}$	-2	2 2 11 $\frac{1}{4}$	-2	2 17 2 $\frac{1}{4}$	-2	3 11 5 $\frac{1}{4}$
-25	1 8 2 $\frac{1}{4}$	-25	2 3 2 $\frac{1}{4}$	-25	2 17 5 $\frac{1}{4}$	-25	3 11 8 $\frac{1}{4}$
-3	1 8 5 $\frac{3}{4}$	-3	2 3 5	-3	2 17 8	-3	3 11 11
-35	1 8 9 $\frac{1}{4}$	-35	2 3 8	-35	2 17 11	-35	3 12 2
-4	1 9 0 $\frac{1}{2}$	-4	2 3 10 $\frac{3}{4}$	-4	2 18 1 $\frac{3}{4}$	-4	3 12 4 $\frac{3}{4}$
-45	1 9 4	-45	2 4 1 $\frac{3}{4}$	-45	2 18 4 $\frac{3}{4}$	-45	3 12 7 $\frac{3}{4}$
-5	1 9 7 $\frac{1}{2}$	-5	2 4 4 $\frac{1}{2}$	-5	2 18 7 $\frac{1}{2}$	-5	3 12 10 $\frac{1}{2}$
-55	1 9 11	-55	2 4 7 $\frac{1}{2}$	-55	2 18 10 $\frac{1}{2}$	-55	3 13 1 $\frac{1}{2}$
-6	1 10 2 $\frac{1}{2}$	-6	2 4 10 $\frac{1}{4}$	-6	2 19 1 $\frac{1}{4}$	-6	3 13 4 $\frac{1}{4}$
-65	1 10 3 $\frac{3}{4}$	-65	2 5 1	-65	2 19 4	-65	3 13 7
-7	1 10 9 $\frac{1}{4}$	-7	2 5 4	-7	2 19 7	-7	3 13 10
-75	1 11 0 $\frac{3}{4}$	-75	2 5 6 $\frac{3}{4}$	-75	2 19 9 $\frac{3}{4}$	-75	3 14 0 $\frac{3}{4}$
-8	1 11 4 $\frac{1}{4}$	-8	2 5 9 $\frac{1}{2}$	-8	3 0 0 $\frac{1}{2}$	-8	3 14 3 $\frac{1}{2}$
-85	1 11 7 $\frac{3}{4}$	-85	2 6 0 $\frac{1}{2}$	-85	3 0 3 $\frac{1}{2}$	-85	3 14 6 $\frac{1}{2}$
-9	1 11 11	-9	2 6 3 $\frac{1}{2}$	-9	3 0 6 $\frac{1}{2}$	-9	3 14 9 $\frac{1}{2}$
-95	1 12 2 $\frac{1}{2}$	-95	2 6 6 $\frac{1}{4}$	-95	3 0 9 $\frac{1}{4}$	-95	3 15 0 $\frac{1}{4}$
10-0	1 12 0	13-0	2 6 9	16-0	3 1 0	19-0	3 15 3

Editorial Notes.

New Agricultural Legislation.

The third session of the Twenty-second Queensland Parliament may well be regarded as a distinctly agricultural assembly. The measures foreshadowed in the Opening Speech of His Excellency the Governor (the Right Hon. Sir Matthew Nathan) are of much moment to the man on the land. The general tenor of the legislation proposed is in the direction of building up a higher and more complete rural civilisation. The programme includes such important measures as the Producers' Organisation Bill (now set down for the third reading), Fruit Cases Act Amendment Bill, Co-operative Agricultural Production Act Amendment Bill, State Advances Act Amendment Bill, a Bill to deal with the Dawson Valley Irrigation and Water Conservation Scheme, Agricultural Education Bill, Discharged Soldier Settlement Act Amendment Bill, Closer Settlement Act Amendment Bill, and a Forestry Bill.

* * * * *

Primary Producers' Organisation Bill.

"It is recognised now that Agriculture, the mother of all wealth, is one of the most important industries, requiring not only a greater amount of energy, but a greater intelligence than any other calling." This dictum of the Minister for Agriculture (Hon. W. N. Gillies) in the course of his second-reading speech on the Primary Producers' Organisation Bill indicates the underlying principles of that important measure. The Bill, which has now reached the third reading stage, provides for the establishment of the Queensland Producers' Association, incorporates the Council of Agriculture and District Councils, and generally gives statutory sanction and power to the scheme for the complete organisation of the agricultural industry in Queensland. A full survey of its provisions will be published in the September Journal.

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Agricultural Education Bill.

Another measure of far-reaching importance to the agricultural industry has been introduced by the Minister for Education (Hon. John Huxham) in the form of a Bill to make better provision for agricultural education. No scheme for rural organisation would be complete without some provision for the extension of agricultural education. Current statistics set out in bold relief the national value of primary production. All our new wealth is derived from the soil. Agriculture calls for trained intelligence the same as any other vocation that demands an application of a combination of science and art. The Bill provides for the appointment of a board, upon which the Queensland University and agricultural educationists will be represented, and its purpose is to open up a new furrow in the field of agricultural knowledge for the benefit of children attending the State and rural schools. The board will have complete control of agricultural schools and agricultural classes.

* * * * *

A Bill to Amend the Fruit Cases Act.

"The Bill is to give effect to the wishes of the fruitgrowers to make regulations for packing, grading, and standardisation of fruit." By this remark, in the course of his introduction of the measure, the Minister for Agriculture (Hon. W. N. Gillies) set out its object. The Bill is one of two clauses, and provides that no person shall (a) pack any fruit or vegetables intended for sale unless such fruit or vegetables is or are graded as prescribed by regulation; or (b) sell any fruit or vegetables in a package if such fruit or vegetables is not or are not graded as prescribed by regulation; or (c) sell the whole or any part of any lot of fruit or vegetables unless such lot of fruit or vegetables is stacked as prescribed by regulation; (d) sell any lot of fruit or vegetables if such fruit or vegetables is not or are not graded as prescribed by regulation.

Event and Comment.

Federal Guarantee for Cotton.

The Federal Government is taking a live interest in the development of the cotton-growing industry. The Commonwealth Cabinet has given consideration to the question of guaranteeing next season's cotton crop on the basis of £1 for £1 with the State Governments, on the understanding that the Empire Cotton Growing Association will co-operate. The amount of the guarantee, in detail, in connection with the Federal advance has not yet been decided. The Minister for Agriculture (Hon. W. N. Gillies) advises that the State Government guarantee has been extended to 31st July, 1923. The question of a further extension is now receiving Cabinet consideration.

Sugar Exhibits at the Brisbane Show.

The Australian Sugar Producers' Association intends to stage a comprehensive sugar exhibit at the forthcoming Show of the Royal National Association, opening at Brisbane on 7th August. A special feature will be a continuous band or frieze running along the top of the panels, containing, in large and clear texts, various facts and figures concerning the industry, so that he who strolls casually through the court may read and learn as he goes. The centre of the space will be filled by exhibits from the mills and refineries, showing the different processes of manufacture, and by industries allied to, or dependent on, sugar. An interesting feature will be a small hand crushing mill, by means of which there can be demonstrated to the public the actual analysis of juice from the sugar cane. A chemist will be in charge of this section, and short lectures will be given to visitors. The Royal National Association, evidently, and quite fittingly, intends to make exhibits of Queensland's most important agricultural industry one of the leading features of this year's Show.

Beerburum Fruit—Returned Soldiers' Success.

A very fine collection of well-grown Beerburum products, including pineapples, papaws, Seville oranges, passion fruit, and Lisbon lemons, was exhibited in the Office of the Minister for Lands recently. Commenting on the display, the Minister (Hon. J. Harry Coyne) remarked that the exhibit supplied effective evidence of the suitability of the land within the limits of the Beerburum Soldiers' Settlement for profitable fruit production. The papaws were unusually large, and the pineapples weighed up to 7½ lb. each. One fine sample came from the farm of Mr. J. McG. Walker—an ex-serviceman 60 years of age. Mr. Walker also sent a number of large, clean-skinned Seville oranges, taken from 2-year-old trees. The pines displayed would go from nine to twelve to the case. The Beerburum pine crop this year is expected to average about fifteen per case. Ordinarily a case holds about twenty. The Minister was particularly pleased with the excellence of the passion fruit exhibits, and regarded them as further disproof of the assertion that this fruit cannot be grown at Beerburum. The whole display was indicative not only of the adaptability of the Soldiers' Settlement to fruit production but also of careful and correct cultivation.

The Bee-eater.

At a recent meeting of the Brisbane District Crows and Flying Foxes' Destruction Board, two members of the Queensland Beekeepers' Association, Messrs. Butler and Jones, addressed the assembly on the habits of the Bee-eater, or Rainbow Bird (*Meropsonatus*). Mr. Butler said that the birds would wait in trees near the hives, and when the bees flew past would dive at them and eat them. It was a severe trial for the beekeeper. Mr. W. F. Lyon, a notable beekeeper, had said that the bee-eater was a serious drawback to the industry. Mr. Jones said that he had had forty years' experience with bees, and he quoted a case where the contents of the stomach of one of these birds revealed four bees. He had never shot one of these bee-eaters without finding the sting of bees in the stomach. Mostly the bird kept a short way from the hives, but in wet weather, when the bees did not venture far out, the birds went right to the apiary. The question as to whether the bird should continue to receive protection was discussed. Mr. A. H. Chisholm (State secretary of the Ornithologists' Union) spoke, by invitation. He said that the naturalists were not blind to the man on the land. The bee-eater's stronghold was Queensland, and was not so bad in the other States. The board decided to recommend that this bird should be removed from the protected list.

New Markets for Meat.

As the outcome of special inquiry, the belief is gaining ground that Australia will find an easement in the meat situation by cultivating a demand for her pastoral products in the populous countries in the North. They may be shipped either as frozen meat, boneless beef, tinned meats, or even to the nearer countries on the hoof, but it is felt that, in one form or another, there are big markets awaiting development practically at our door. Much information has been collected by the Graziers' Association, and this will facilitate final recommendations and decisions. Opinions as to the practicability of the proposal vary considerably, but, generally, the outlook is regarded as hopeful.

Already a fair beef trade exists between the North and North-west of Australia and Java, and this business is expanding. As Java has a population of 40,000,000 the possibilities there may not be overlooked. Japan is also a possible big customer. Already one shipment of 100 tons of frozen beef has been despatched to Japan to fill an army order, and the prospect of extending business to the civilian population seems fairly hopeful.

"The Chinese are a nation of meat-eaters, their purchases being limited only by their purses," is the remark of a Federal Government representative in a recent report. The meat hunger of the Chinese Labour Corps was proverbial in France during the war, and was no little cause for anxiety to those who controlled the commissariat, particularly at rail-head dumps where Chinese were employed. China should provide ample room for an extension of the meat trade. Already the United States and Canada are fairly large shippers of meat to Shanghai and Hong Kong, and they are selling beef there at practically the same price at which it can be landed from Queensland to-day. America is evidently looking well ahead and is prepared to sacrifice present profits for future prospects, and Australia, apparently, must be prepared to do the same if our Northern markets are to be extended and permanently established.

Defrosting Meat.

The Rayson-Cooper meat defrosting process has so impressed graziers that an effort is being made to secure Commonwealth control of it in the interests of the meat industry of Australia, and to this end the aid of the Queensland Government has been invoked. In the course of a recent statement on the subject the Premier (Hon. E. G. Theodore) expressed appreciation of the value of the representations made to him by the United Graziers' Association, and stated that, acting on their suggestion, he had communicated with the Federal Government on the matter. The Premier also referred to a report which he had received from the Agent-General (Hon. J. A. Fihelly) dealing with a demonstration, at which a representative of the Queensland Government was present, of the process in London. The demonstration was carried out at the British and Argentine Company's stores, West Smithfield. Veterinary experts were in attendance from the Australian and New Zealand High Commissioners' offices; also a representative of the Queensland Meat Export Company. The conditions observed were:—

- (1) The meat was inspected and weighed before being placed in the defrosting chamber;
- (2) The chamber was sealed after the meat was deposited;
- (3) After removal from the defrosting chamber the meat was weighed under the observation of experts;
- (4) The meat was held for a few days and joints were cut;
- (5) Meat similar to that placed in the defrosting chamber was thawed out in the atmosphere and afterwards compared with that defrosted by the process.

The test was commenced on 20th March last, the meat used being Q.M.F. and Argentine beef and New Zealand and Argentine mutton and lamb. All the meat was carefully weighed at the time of removal, and the weights were compared.

It is set out that the mutton and lamb increased in weight, and there was a slight loss in the weights of some of the beef. All the meat was pronounced by experts to be thoroughly thawed and free from dripping, even when cut. On final examination from three to five days after removal from the chamber it was found to be sound and free from taint. It is stated by the promoters that the beef treated by the process had been sent to the shops of the British and Argentine Company and sold as chilled meat.

The Raw Cotton Situation.

"Cotton," the official journal of the Manchester Cotton Association, commenting on the raw cotton situation, early in June, remarks that the new crop continues to attract considerable attention, and there have been issued quite a number of forecasts of the condition of the crop, the principal one being that of the United States Government, which figured the condition of the crop on 25th May at 69.6, compared with 66.0 twelve months ago, and a ten-year average of 74.6. The National Ginners' estimate was 72.1. Reports indicated the invariable backwardness of the crop, which must make it more susceptible to boll weevil damage and later frost. In spite of these poor crop accounts, it is well to remember that the cotton plant has wonderful recuperative powers, and it is not unusual for the cotton crop to be proclaimed a disaster many times during the season. The Journal goes on to comment further:—

"Nothing fresh has developed in regard to the acreage prospects, and the average expectation, it is thought, would be for an increase of 10 per cent, for the belt as a whole. This would mean an area of a little over 35,000,000 acres on the revised estimate of last season, on which an average yield of 178 lb. lint to the acre would mean a crop of 13,000,000 bales, exclusive of linters. With a favourable growing season, better results may be realised, particularly as all reports indicate an abundant supply of labour for proper cultivation. In West Texas and around the rim of the belt from Texas to the Atlantic coast, the increase in acreage is said to be heavy.

"Trade reports continue encouraging, and consumers of raw cotton are displaying greater interest in the staple. This is no doubt due to their becoming more fully convinced regarding the seriousness of the supply position during the next year owing to the poor accounts of the new crop. Flooded lands have not yet been replanted and probably will not be. Recent weather has been propitious for the spread of the boll weevil, which is becoming increasingly active.

"The trade outlook fosters the belief that the mills will require an appreciably larger supply than the present season; thus a crop of even 13,000,000 bales would prove inadequate.

"It is believed that during the next year America will take at least 750,000 bales more, Great Britain 1,000,000 bales, and the Continent 750,000, in all 2,500,000 bales above the present year's figures of, say, 12,500,000, giving a total prospective consumption of 15,000,000 bales. This may be somewhat of an exaggeration, but there is no reason to doubt that the Continent will take an increasing quantity, and Great Britain, with improving trade, which country's imports are 1,500,000 bales behind this time last year, should take fully 1,000,000 bales more. As the surplus to be carried over at the end of this season is likely to be little above 4,000,000, consumers are realising more and more how precarious the supply position will become."

The Brisbane Show : Departmental Court.

As in former years one of the outstanding features of the Brisbane Show will be the Court of the Department of Agriculture and Stock. A special Cotton Trophy will illustrate every phase of the cotton industry. Other striking features will be exhibits of cereal types, propagation plots, indigenous grasses, sugar-cane, and wool. The work of the Entomological Division and Stock Institute will be well represented. The State Cannery will also stage an effective exhibit of its manufactured products. The colour scheme this year will be in grey and cream relieved with maroon. The trophy designs, plan, and general lay out of the Court are the work of Mr. H. W. Mobsby, F.R.S.A., the departmental photographer and artist.

Australian Fruit in England.

According to cable advices from London (25th July), Messrs. Freeman and Company, selling agents for the Commonwealth Fruit Pool, report that the market for canned fruits both Australian and Californian is very stagnant, owing to wet and unseasonable weather. Choice Australian pears realised up to 18s. 6d. per dozen, peaches to 14s. 9d. If the weather improves, the Australian fruit should do well, as the new Californian pack is a month later than usual. Pears will not arrive until early in October.

The "Grocers' Gazette" congratulates Australian packers on the immense improvement in their production and describes the fruit as of good quality, evenly graded, attractively labelled, and extremely well turned out.

A shipment of Australian oranges, brought by the Moreton Bay, including Queensland mandarins, turned out excellently.

American Prices—Staple Cottons.

An examination of recent American files shows that cotton prices are firm, with an upward tendency traceable to improved statistical situation and to modification of views relative to probable acreage. At the same time, in West Texas, and around the rim of the belt from Texas to the Atlantic coast, the increase in acreage is heavy, due to the idea that boll weevils will cause cotton prices to go much higher, while these sections are relatively free from weevils.

The menace of the flood in the Mississippi River, in so far as the delta below Memphis and the alluvial lands in Arkansas are concerned, is a thing of the past. The effect upon acreage, it is believed, will be slight, although production may be affected to some extent, for the reason that in many instances less fertile lands were substituted in the planting for the lands intended for cotton that were under water.

A View of the American Cotton Crop Outlook.

The "Textile World," of New York, states:—

"Several domestic cotton crops that were killed speculatively during May and June revived sufficiently later in the season to produce some of the largest yields the country has ever seen. A bulge in cotton prices, such as has been experienced in the last two weeks, may carry no conviction to spinners and distributors, and may actually discourage buying of the raw material and its products (as has been the case), but it is an opportune stimulant for growers. A 20 to 21 cent basis for middling upland cotton is sufficiently high to encourage growers to exert themselves to the utmost to get maximum production from the acreage planted and replanted.

"No irretrievable damage has been done by floods in the lower Mississippi valley or by heavy rains in Texas and Oklahoma. Comparatively little cotton land has been flooded, and the heavy precipitation in Texas and Oklahoma is likely to prove a blessing later on. Over the remainder of the cotton belt the weather has been generally favourable thus far. As to what it may be during the balance of the season one man's guess is as good as another's, but the important factor is that a sufficient acreage has been planted to give us one of the largest crops on record, and present prices are high enough to stimulate maximum effort and care in the cultivation of the growing crop.

"Adverse weather conditions are more to be feared by growers this season than is the boll weevil. In previous seasons growers in certain parts of the cotton belt have had reason to believe that they might escape the ravages of the boll weevil, but this year every grower started the season with the knowledge that he could not expect to make a crop unless every precaution was taken to fight this pest. By careful cleaning of the land before planting, by the planting of early maturing varieties of cotton, by the increased use of fertilisers, by careful cultivation, and by the utilisation of chemical and other methods of destroying the insect and its larvæ, this season's cotton crop will be the first general demonstration of the grower's ability to check the ravages of this pest. It is confidently to be expected that real progress will be shown, and that the percentage of the crop lost from this cause will be considerably less than it was last season.

"There is another phase of the recent radical advance in cotton prices that we would like to overlook, because of the discouraging effect that its exploitation might have upon growers, but it must be recognised sooner or later. We refer to the fact that maintenance of current cotton prices must result in a marked restriction of consumption. Even when cotton was selling well below 18 cents demand for cotton manufactures from Asia, Africa, and other so-called cheap markets remained considerably below pre-war volume. Every cent of advance above an 18 or 20 cent basis for middling uplands must involve a further marked restriction in demand from countries of low purchasing power, including the impoverished countries of Europe. It is true that, at current prices, cotton is not selling much above the average basis of commodity prices, which in foreign markets are about 65 per cent. above the pre-war average; yet, to insure anything like maximum pre-war consumption, cotton must be available well below the average commodity level, and that means a maximum of about 18 cents. At that price fair profits for both growers and spinners would be possible, and probably a 12,000,000-bale American crop might be absorbed.

"The fair conclusion to be drawn from these apparently conflicting statements is that spinners cannot hope to operate their machinery at anywhere near maximum capacity unless they can produce goods at prices that can be paid by the inhabitants of countries of low purchasing power, and such prices are not possible unless growers are able to provide an adequate supply of cotton at proportional prices. It means hard work and narrow profits for growers, spinners, and their employees, until such time as world prosperity and buying power are more nearly normal."

Boll Weevil and Overflows.

In reply to an inquiry regarding the effects of floods on the boll weevil, W. D. Hunter, of the United States Government Bureau of Entomology, writes a Southern planter as follows:—

"We have never found a case where extensive overflows have reduced the weevil to the extent that the crop has been greatly benefited. It is true that some weevils are always killed by overflows, but there are survivors in the trees and on the high lands immediately surrounding the overflowed areas. When these areas are replanted the crop is late; in fact, so late that the weevils left are able to overtake the production of fruit."

Next Year's Cotton Consumption.

A correspondent, writing in "Commerce and Finance," New York, states:—

"No matter how large the crop may prove to be, basing calculations on experience, we believe consumption will be far in excess of production.

"When we analyse supply, we consider both the visible and invisible items. With demand, we are prone to pay attention only to the visible, or momentarily tangible aspects of demand. At present we are likely to be swayed too much by slack inquiry for raw material and goods. We overlook factors of far more compelling import—depleted shelves, low inventories among industrial users of cotton fabrics, scanty wardrobes among the fairly well-to-do, and the rags and tatters to which millions of the world's population have been reduced in the last few years. This is the source of the invisible demand. The need is there, urgent and desperate in many cases, requiring only an increment in buying power to render it astonishingly effective. That it will become thus effective, only those who fail to read the signs of the times will doubt.

"While we make no positive prediction, we believe the basis has been laid for a consumption of American cotton for the season of 1922-23 of fully 15,000,000 bales if that supply can be obtained, and unless prices rise practically to a prohibitive point.

"Consumption of American cotton for the year ending 31st July, 1922, we believe will be approximately 12,500,000 bales. In view of the fact that the textile industry of the United States this season has been recovering from depression, with operations retarded by strikes and curtailment, and in view of the indicated improvement in general business, we expect American mills in the season beginning 1st August, 1922, to increase their consumption by at least 750,000 bales.

"We expect British consumption of American cotton to increase by a minimum of 1,000,000 bales. Lancashire, through its recent wage reductions, has placed itself on a competitive basis. Great Britain is not going to permit the extinction of her great textile industry. This season's statistics furnish no guide to the future. According to the 'Financial Chronicle,' exports to Great Britain up to the close of last week were only 1,297,000 bales. This compares with 2,824,000 bales for the corresponding date in 1920. They indicate total exports of less than 1,800,000 bales. The amazing significance of these figures may be appreciated when we find that we have to go back to 1874, nearly half a century, to find British imports on approximately the same scale. The United Kingdom took more than 2,000,000 bales as far back as 1858. We therefore consider the estimate of 1,000,000 bales increase extremely conservative.

"The continent in our opinion, will increase by fully 750,000 bales of American cotton. Italy, according to our advices, is preparing to increase at the rate of 20,000 bales per month. Germany, Poland, and Czecho-Slovakia will be working on a much larger scale. France has by no means reached her limit. The figures on Japan and China we leave unchanged. Any deficit from this quarter is likely to be made up by additions for other countries.

"This makes a total addition of 2,500,000 bales to the probable consumption of 12,500,000 bales this season, or a prospective absorption of 15,000,000 bales. According to the Census Bureau, the total carry-over of American cotton in all positions throughout the world last season was 9,172,000 bales. The crop of last season was about 7,800,000 bales, making an aggregate of 16,972,000. This season's consumption of 12,500,000 bales would reduce the total surplus to less than 4,500,000 bales. A crop of 12,000,000 bales for the new season would give a total supply for 1922-23 of about 16,500,000 bales to meet an indicated demand for 15,000,000 bales. This would be nearer to famine than the cotton world has been since Civil War days. If the crop should be less than 12,000,000, the effect of the resultant stringency would be indescribable."

Recapitulation of Cotton Exports from the United States for 100 Years.

The subjoined table indicates a century's progress, decade by decade, and the enormous value of the cotton industry to the United States. Incidentally the figures open out a new vista of agricultural development and possibilities in Queensland.

Decade.	Bales.	Tons.	Value.
			\$
1821-1830 ..	4,071,687 ..	1,017,923 ..	256,632,567
1831-1840 ..	8,634,662 ..	2,158,667 ..	528,789,702
1841-1850 ..	13,989,587 ..	3,497,398 ..	553,427,062
1851-1860 ..	23,601,577 ..	5,900,395 ..	1,146,092,778
1861-1870 ..	8,089,101 ..	2,022,258 ..	1,083,373,097
1871-1880 ..	28,420,585 ..	7,105,148 ..	1,945,673,249
1881-1890 ..	42,642,888 ..	10,660,724 ..	2,206,812,580
1891-1900 ..	60,837,298 ..	15,209,327 ..	2,256,455,584
1901-1910 ..	74,733,416 ..	18,683,356 ..	3,859,233,593
1911-1920 ..	76,190,467 ..	19,017,620 ..	6,512,761,108
Grand total ..	341,211,268 ..	85,212,816 ..	20,349,251,320

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JUNE IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JUNE 1922, AND 1921, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	June.	No. of Years' Records.	June, 1922.	June, 1921.		June.	No. of Years' Records.	June, 1922.	June, 1921.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
	In.		In.	In.		In.		In.	In.
Atherton	1'59	21	1'31	2'95	Nambour	3'42	26	2'02	8'59
Cairns	2'86	40	2'71	8'12	Nanango	2'05	40	1'47	7'68
Cardwell	2'07	50	1'50	2'77	Rockhampton ...	2'07	35	1'82	7'07
Cooktown	2'04	46	1'48	4'13	Woodford	2'67	35	2'23	8'36
Herberton	1'01	35	0'91	2'68					
Ingham	2'46	30	1'75	4'91	<i>Darling Downs.</i>				
Innisfail	7'04	41	9'37	10'25	Dalby	1'68	52	2'55	5'57
Mossman	2'39	14	1'58	6'41	Emu Vale	1'44	26	1'55	4'75
Townsville	1'27	51	0'19	0'58	Jimbour	1'71	34	2'45	7'03
<i>Central Coast.</i>					Miles	1'92	37	2'04	4'28
Ayr	1'30	35	0'73	0'36	Stanthorpe	1'89	49	1'49	5'81
Bowen	1'61	51	0'50	0'69	Toowoomba	2'37	50	1'64	6'56
Charters Towers ...	1'33	40	0'30	0'33	Warwick	1'80	57	2'08	5'54
Mackay	2'71	51	1'34	2'93	<i>Maranoa.</i>				
Proserpine	3'49	19	1'26	6'18	Roma	1'68	48	3'27	3'80
St. Lawrence	2'46	51	1'46	2'90					
<i>South Coast.</i>					<i>State Farms, &c.</i>				
Biggenden	1'86	23	2'38	3'93	Bungeworgorai ...	1'67	8	2'58	3'76
Bundaberg	2'72	39	1'57	4'48	Gatton College ...	1'75	23	1'63	6'08
Brisbane	2'64	71	1'83	7'98	Gindie	1'55	23	1'10	3'97
Childers	2'20	27	2'33	3'86	Hermitage	1'96	16	2'10	5'17
Crohamhurst	4'09	30	1'81	11'05	Kairi	1'25	8	Nil	4'45
Esk	2'06	35	1'24	6'29	Sugar Experiment Station, Mackay	2'37	25	0'91	3'00
Gayndah	1'87	51	1'36	6'56	Warren	1'90	8	Nil	7'17
Gympie	2'51	52	3'13	5'57					
Glasshouse M'tains	4'10	14	1'66	11'15					
Kilkivan	2'07	43	1'28	9'03					
Maryborough	2'81	51	2'50	3'89					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for June this year, and for the same period of 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE E. BOND,
State Meteorologist.

Production, Prospects, and Prices.

The following market survey is an abridgement of departmental summaries of conditions, prospects, and prices for the monthly period ended 28th July, 1922:—

Agriculture.

General rain at intervals in the course of the period was most opportune, and altered completely the whole outlook, more particularly as concerns wheat. Seasonal conditions prevailed and sharp frosts were recorded in most areas. Winter crops are well forward, but the season is too far advanced to permit of some fodder classes (particularly root crops) benefiting by the altered conditions. A continuance of normal factors will mean, probably, an excess of the 1922 wheat crop over last year's harvest.

Cotton is receiving marked attention in every agricultural area, and the 1922-23 crop promises to be a record since the revival of cotton culture within this State.

Arrowroot production for milling purposes has been influenced adversely by last year's slump in prices.

Preparation for potato-planting are well forward in localities where early planting is usually practised, but continued low temperatures may influence growers who usually prefer July planting in deferring operations.

Towards the end of the term wheatgrowing prospects improved greatly and in many localities there was a sufficiency of sub-surface moisture to carry cereals on to the advanced stages of growth.

Lucerne Chaff.—As the term advanced supplies increased and prices receded; 9s. 6d. for prime was the top and 4s. for inferior was the minimum for the month.

Oaten Chaff.—4s. 4d. to 9s. 6d. was the month's range. Supplies were moderate and trans-border consignments light.

Mixed Chaff.—5s. 6d. to 8s. 4d. were the extremes for the month. Supplies and demand moderate.

Maize.—Prime grain values to 4s. 4½d. early in the term. The following week showed a slight advance, prime bringing 4s. 5½d. In the third week quantities increased and sales were made at from 4s. 2d. to 4s. 6½d. Last week grain was plentiful, demand fair; sales to 4s. 8½d. Other lines held 4s. 5d. to 4s. 7½d.

Potatoes.—Sales were effected at 4s. to 7s. early in the month. Light to moderate quantities came to hand later and business was done at 4s. to 7s. 11d. Some lines were held at 4s. to 8s. 6d. In the third week clearances were made at from 4s. to 7s. 9d.; new realised 9s. Last week demand eased; sales from 5s. to 8s.

Sweet Potatoes.—Supplies moderate early in the period—4s. 6d. to 5s. 6d. Second week, light supplies—3s. to 4s. 9d. These conditions continued up to last week when sales were made at 2s. 6d. to 5s. 1d.

Pumpkins.—Last week supplies were fair; sales from 4s. to 5s.

Broom Millet.—At the end of the month sales were made at from £50 to £60 per ton.

Fat Stock.

Review of fat stock market during the week ended 28th July:—

Cattle.—980 yarded, mostly bullocks, from fair to prime. The market opened very firm, with values higher than preceding week's figures. Prime from 22s. to 25s. per 100 lb. Later, values eased. Prime bullock beef averaged 22s. 6d., medium and good trade beef, 20s.; best cows were worth generally from 15s. to 17s.

Sheep.—6,655 offered. Yarding, mixed. Commencement values firm and hardened as market progressed. Demand brisk for all descriptions. Prime mutton, 5d. to 5½d.; medium and good trade mutton realised to 5d., in addition to skin value.

Pigs.—Marburg Sales, 29th July.—230 pigs were yarded, and baconers made 7d. 1b. throughout, and were eagerly sought after. Prices paid were:—Backfatters, £1 5s. to £6 2s.; baconers, heavy, £3 10s. to £3 19s. 6d.; medium, 60s. to 69s. 6d.; light, 48s. to 59s. 6d.; porkers, 40s. to 50s.; stores, 15s. to 30s.; slips, 6s. to 12s. 6d.

Fruit and Vegetables.

A system of obtaining absolutely accurate market information is being devised and prices to the grower will, it is hoped, be published in the next Journal and thereafter.

General Notes.

Guarantee to Cotton-growers.

It is said that some prospective cotton-growers are hesitating, not feeling certain about the duration of the time during which the Government guarantee of 5½d. per lb. for the crop will hold good. The Minister for Agriculture (Hon. W. N. Gillies) has stated that it will hold good until 31st July, 1923.

Publication Received.

We have received from the Director of the Dominion Experimental Farms and Stations, Ottawa, Canada, "Seasonable Hints," a very interesting publication, from which we have taken two articles which give good advice to Canadian farmers, and which apply to the man on the land in our own State.

Destroying Ants.

We frequently are asked to give some remedy for the destruction of black ants, and only recently we published several proved remedies. As a present inquirer may not have seen these, let him try the gasoline cure. Pour a half-pint of gasoline into the ant hill or nest of the pests. This will instantly spread through all the nest or hill when it is set on fire; and as the heat on the surface increases, the gas will generate from the utmost recesses, and the fire will cook the ants. The amount of gasoline stated will burn for a long time, and kill every ant in the largest nest as well as all which attempt to enter it from without.

Manufacture of Motor Spirit.

For some time past the Bundaberg Distillery Company has been experimenting with power alcohol as a means of utilising instead of destroying the immense quantities of molasses produced, and which cannot be conserved in the manufacture of rum. Mr. W. R. Hartnell (chairman of directors) has succeeded in manufacturing power alcohol on a commercial scale, and maintains that the product can be marketed to car-owners at 1s. per gallon less than petrol. The spirit, it is stated, can be used in any car without alteration to existing equipment, and on recent trials on cars used in connection with the Prime Minister's visit to Bundaberg gave within 5 per cent. of the mileage obtained by the use of petrol.

Queensland Agricultural College Bursaries.

An examination will be held on the 9th and 10th November next, in Brisbane and elsewhere, according to where the candidates reside, for four bursaries at the Queensland Agricultural College, tenable for three years. Candidates must not be less than 16 or more than 18 years of age on the 1st January, 1923. Candidates failing to obtain a bursary, but who pass this examination, will be considered to have passed the College entrance examination, and may enter the course for the Diploma in Agriculture on payment of the College fees. Nominations close on the 25th October, 1922. Further particulars can be obtained upon application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

The Boll Weevil.

The statement issued by the United States Department of Agriculture referring to boll weevil has attracted considerable attention. A correspondent states that according to this statement an unprecedentedly heavy infestation of weevil is likely this year, and farmers are advised to limit their acreage to areas which can be thoroughly cultivated. It appears that this statement regarding the weevil outlook is based upon the result of tests conducted in the Government experimental station at Tullulah, Louisiana, where the insects are kept under observation during the winter and their condition noted after freezing weather has passed. These tests, it seems, showed that five times as many weevils as usual survived hibernation, but the question is whether tests conducted in this particular locality can be considered representative of the entire belt.

Many cotton men believe that the winter mortality of the insect may have been much greater in more northerly sections, and there has been considerable criticism of the official statement as tending to support propaganda for a restricted area or against any greatly increased acreage.—"Cotton."

Forestry Legislation and Education.

The projected Forestry Bill and the matter of stimulating education and research in forestry were the chief subjects discussed at the last meeting of the Empire Forestry Association, at which His Excellency the Governor, Sir Matthew Nathan, presided.

Consideration of the status of forestry legislation in Queensland, deferred from a previous meeting, was to have been resumed. It was reported, however, that the Minister for Lands, Mr. Coyne, had given an assurance that a Forestry Bill would, in all probability, be introduced during the present session, and that a skeleton draft of the measure would be submitted to the association with the view to practical suggestions being offered.

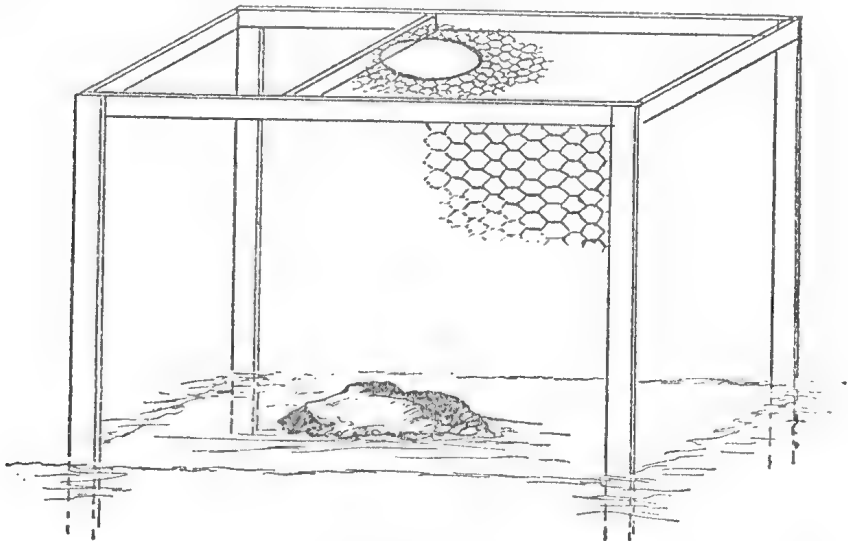
The meeting accordingly turned to the question of education and research which was introduced by Mr. Henry Tryon, chief of the Division of Entomology, Department of Agriculture and Stock. After Mr. Tryon had emphasised the importance of cultivating a knowledge and appreciation of trees among school children and at the University, the following subcommittee was appointed to consider and report upon the subject:—

Messrs. E. H. F. Swain and C. R. Paterson (Forestry Department); Professor Hawken and Dr. Bagster (Queensland University); Messrs. R. A. Wearne and L. C. Morris (Technical College); C. Thompson (Teachers' Training College); Miss F. Bage (secondary school); Messrs. J. C. Stubbin (primary schools); W. J. Doak (Railway Department); F. O. Nixon (Timber Merchants' Association); C. T. White and H. Tryon (Agricultural Department); and Dr. H. I. Jensen (Geological Department).

In the discussion bearing upon the subject special reference was made to the value of Arbor Day in the schools, and Mr. A. E. Kennedy (Under Secretary for Education), assured the meeting of the continued cordial support of his department in this direction.

An Effective Crow Trap.

Mr. W. G. Brown, State Sheep and Wool Expert, supplies the following particulars of an effective crow trap:—One of the best traps for crows I have seen is that figured below.



As will be seen it is a rectangular frame covered with wire netting on top, bottom, and sides. On the top a circular space is left free from netting alongside a cross bar on which the crow alights. The bait, any carrion will do, is laid on the earth below the opening. The crow alights on the bar and drops through the aperture on to the bait. When surfeited, he naturally attempts to fly out, but the spread of his wings effectually prevents his escape. With this trap I have seen as many as twenty crows captured in one day. When one crow is caught he attracts others. The specifications are—Size of framework: 6 feet x 4 feet x 6 feet. The uprights should be let into the ground to a depth of about 1 foot. The aperture should be about 20 inches in diameter.

The Public Curator.

The Public Curator, whose advertisement appears in this paper, makes up wills free of any charge, when a testator or testatrix desires to appoint him trustee and executor. It is noteworthy that he has special powers under his Act, which enable him to provide for the maintenance, education, and general up-bringing of infant beneficiaries; legal advice and assistance are also given free, and all matters dealt with by him are strictly private. All trust funds in his hands belong to the beneficiaries for whom he is trustee and not to the Government, though the Government is behind him to protect the public if he commit a breach of trust. His accounts are under the supervision of the Auditor-General, and he is also directly responsible to the Supreme Court for his trusteeship. The Public Curator will be glad to give information to any one seeking it.

Interstate Fruit Specials.

Fruit trains run on behalf of the Southern Queensland Fruit Growers' Society, Ltd., cleared Wallangarra on Friday and Saturday for the week ended 15th July, carrying 304½ tons, of which 193½ tons were for Melbourne and 111½ tons were for Sydney, consisting of 5,280 cases of bananas, 1,956 cases of pines, 355 cases of citrus, 11 cases of passion fruit, 70 cases of custard apples, 19 cases of papaws, 3 bags of peanuts, and 34 bags of beans. Melbourne took 3,714 cases of bananas, 814 cases of pines, 351 cases of citrus, 4 cases of passion fruit, 1 case of custard apples, 3 cases of papaws, and 3 bags of peanuts. Sydney took 1,566 cases of bananas, 1,142 cases of pines, 16 cases of papaws, 7 cases of passion fruit, 68 cases of custard apples, and 34 bags of beans. District loadings by tonnage were:—Dayboro' line—to Melbourne, 25 tons; North Coast—to Sydney, 51½, to Melbourne, 153; Tweed Heads—to Sydney, 49; Currumbin—to Sydney, 10½, to Melbourne, 15½.

Arsenic as a Cotton Pest Killer.

Thus the "Queensland Government Mining Journal"—

The "Engineering and Mining Journal-Press," of New York, in its issue of 20th May, 1922, gives prominence to the uses of arsenic in the cultivation of cotton, particularly in fighting the cotton boll weevil, a pest which, fortunately, we are not at present troubled with in Queensland. Through Government research calcium arsenate has been found effective, when properly applied, against the boll weevil, and as the encroachment of the boll weevil has encompassed the entire cotton-producing section of the United States at this time, the demand for and use of calcium arsenate will be greatly increased. The basic purpose of the poisoning is to merely keep the weevils sufficiently reduced in number so that their feeding will not increase the fruit shed which would be experienced in their absence; that is to say, the weevils are allowed to develop undisturbed until they approach the point of actually reducing the crop, and are then held in check by poisoning just long enough to let the plant set and develop beyond weevil injury all bolls that it will be able to mature.

If calcium arsenate is properly made it will not injure the cotton plants, nor is it nearly so dangerous as paris green, as it does not possess the caustic characteristics of the latter. When properly applied from 5 to 7 lb. of calcium arsenate are required to an acre for each application, the number of applications usually varying from three to five, with an interval or from four to seven days between applications, depending upon the extent of the infestation and atmospheric conditions. Owing to the cost of the material and applying, the Government states that it seems inadvisable to attempt poisoning of land which is not capable of making at least one-half bale of cotton per acre in the absence of weevil injury. The gain secured by poisoning ranges as high as 1,000 lb. of seed cotton per acre, and on fairly fertile soil, subject to a serious degree of weevil injury, average gains of from 300 to 500 lb. of seed cotton per acre are entirely possible.

There seems to be no method of determining an average amount of arsenic used in the manufacture of calcium arsenate, owing to seasonal demands varying in accordance with agricultural conditions; that is to say, with low prices for cotton, comparatively little boll-weevil poisoning would be undertaken by the planters, whereas with good prices for cotton, and the consequent necessity of saving the crop, there would be a demand for a large amount of calcium arsenate. The quantity of calcium arsenate used per acre will vary from 15 to 25 lb., according to the number of applications required; and, if the use of calcium arsenate became at all general throughout the cotton-producing area, it would afford a market for practically all of the arsenic produced in the United States.

The principal difficulty at the present time is in securing an effective method of application. Calcium arsenate is used in exceedingly fine powdered form, and is applied either by machines treating five rows of cotton at a time, or by means of a hand gun, usually carried by a man on horseback, treating one row at a time.

Answer to Correspondent.

Cockroaches and their Extermination.

V.F.S. (Woombye)—

Mr. Henry Tryon, Entomologist-in-Chief, supplies the following information in answer to your query:—

Houses about Brisbane are subject to infestation to a greater or less extent by different kinds of these pests. In fact, there are about at least six distinct species to be met with in Brisbane tenements alone. Any satisfactory reply to it cannot therefore be given without knowing in the first place which one is at present in any instance of infestation, such as the one at Glen Vale referred to.

This is due to the fact, not only that their habits are different, but rather that what one cockroach will consume individuals of another kind will not touch. This remark in fact especially applies to the small so-called "German cockroach" that will not take baits that contain arsenic (whilst one or more of the larger kinds are very partial to it) or only be made with difficulty to allow this poison to enter into their systems. There are several cockroach proprietary specifics sold by chemists and druggists.

The small cockroach mentioned, and a second cockroach the same size is, however, killed by powdered borax. Further, there is a very useful phosphorus bait, understood to contain sweetened flour paste impregnated with this body, after just dissolving it in carbon bisulphide; but the latter solution, being inflammable, it is preferable to try the mixture already made and placed in special containers. This paste, when employed, is simply thinly spread on pieces of paper or cardboard, that when so treated are placed in the haunts of the cockroaches, whose destruction is aimed at.

In rooms, or houses containing rooms, that can be completely closed against the egress of vapours, the insect may be killed by fumigating with sulphur fumes, pyrethrum (or insectibane) fumes, hydrocyanic acid fumes, and by others of their kinds. Two or three hours submission to their action is generally all that is required. However, a second fumigation is necessary when a few weeks have elapsed since the first was executed to admit of the eggs hatching out, since these bodies themselves can with difficulty be assailed when placed side by side in the peculiar cockroach egg cases.

Cockroaches may again be trapped in large numbers. The traps made for this purpose, however, greatly vary. A simple one is composed of a single wooden box in the cover of which is a round hole into which the neck of a wide mouth bottle just fits. This box is just baited with some food substance to which cockroaches are very partial (sweetened stale beer in the case of one kind of cockroach) and then placed in their haunts as night is coming on.

Note.—I find that amongst cockroach poisons stocked by chemists here are—Paris green, blatticide, scatter, roach, and borax, the merits of all of which are equally extolled.

SHOW DATES 1922 AND 1923.

Show society secretaries are invited to forward for insertion in this list dates of forthcoming shows. Alterations of dates should be notified without delay.

Belmont: 19th August.
Horticultural Society of Queensland
(Annual): 19th August.
Coorparoo: 26th August.
Kenilworth: 31st August.

Imbil: 13th and 14th September.
Laidley: 13th and 14th September.
Sherwood: 16th September.
Rocklea: 23rd September.
Kilcoy: 28th and 29th September.

Beenleigh: 1st and 2nd September.
Zillmere: 1st and 2nd September.
Gympie: 7th, 8th, and 9th September.
Wynnum: 9th September.

Esk Camp Drafting: 4th and 5th October.
Pomona, 4th and 5th October.
Southport: 6th October.
Enoggera: 7th October.

WARWICK.—Eastern Downs Horticultural and Agricultural Association: 13th, 14th, and 15th February, 1923.

FRUIT FLY INVESTIGATIONS.

[FOURTH PROGRESS REPORT.]

By HUBERT JARVIS, Entomologist in Charge of Fruit Fly Investigations at Stanthorpe.

Early in February of this year Mr. Hubert Jarvis, of the Division of Entomology, Department of Agriculture and Stock, was appointed to investigate the Fruit Fly Problem in the Granite Belt. The first report of his observations and activities was published in the May Journal. The second and third reports appeared in June and July, respectively, and the following report is now made available by the Minister for Agriculture and Stock (Hon. W. N. Gillies).

[LETTER OF TRANSMITTAL.]

Sir,—I have the honour to submit, and at the same time to recommend for publication, the Fourth Progress Report by Mr. H. Jarvis, Entomologist in charge of Fruit Fly Investigations, Stanthorpe, premising that the portion "Seasonal Absence of Fruit Fly," and dealing with a special investigation into the possible occurrence of the insect in the northern districts of New South Wales, abutting on the Stanthorpe area, has already been made the subject of a separate document, giving more detail, dated 14th July, 1922. It is further to be added, in reference to the section "Cold Storage and Fruit Fly," that whilst the report emphasises the value of this operation for the purposes set forth, it obviously ventures no opinion on the general adaptability of Stanthorpe fruit for continuous submission to the process, nor on the admissibility of the latter as an economic procedure—questions that are not, primarily, entomological ones.

I have, &c.,

HENRY TRYON, Entomologist-in-Chief.

WINTERING OF FRUIT FLY.

Although, possibly, fruit-fly maggots may still be found present in stored fruits, those which have been under observation in the laboratory since 23rd June, 1922 (on Ben Davis apples), have now all perished, presumably owing to very low temperatures experienced during the last few weeks. One specimen of *B. Tryoni* (Queensland Fruit Fly) emerged in this Office on 20th June, 1922, from larvæ collected on 23rd March, 1922, on quinces. This fly, however, was very much crippled, and died soon after emergence.

Adult fruit flies have been kept alive in glass jars in the laboratory for nine weeks. None originally collected are, however, alive to date.

Search has been made in packing-sheds and other suitable situations with a view to the possibility of finding the fruit fly (*B. Tryoni*) hibernating as a mature insect, but no specimens have so far been met with.

Fruit fly pupæ, apparently alive, are still under observation in this Office.

SEASONAL ABSENCE OF FRUIT FLY.

Consequent on reports that abandoned and neglected orchards existed in New South Wales, adjacent to the Queensland border, arrangements were made by the Queensland Agricultural Department to investigate the question, the Department of Agriculture of that State co-operating with it and deputing their Government Entomologist-in-Chief, Mr. W. W. Froggatt, F.L.S., to assist in the undertaking.

Mr. Froggatt accordingly arrived at Stanthorpe on 28th June, 1922, and in his company the following places were visited:—Marylands Station and district, Wylie's Creek, Liston, Undercliff, Wilson's Downfall, Rivertree district, Wallangarra, Tenterfield, and Boonoo Boonoo. In most of the above districts abandoned and neglected orchards were noted, and visits of inspection made (*vide* report, 14th July, 1922). On the first day of inspection the party was accompanied by Mr. W. Ranger, President, Southern Queensland Fruit Growers' Association, and he took a very keen interest in the investigation and in viewing these neglected orchards first hand, so to speak, but owing to his many engagements he was, unfortunately, unable to make one of the party on its inspections subsequently.

The possibility of the existence of the fruit fly (*B. Tryoni*) in the maggot or other stage at the present time of the year, outside the Stanthorpe area and at a

lower altitude, was also made a subject of investigation, and in pursuance of this object a vine scrub, situated on the Warwick road, about 25 to 50 miles from Stanthorpe, was visited, as also was Patterson's Scrub, lying, at a similar distance north of Stanthorpe, in New South Wales.

Both Patterson's Scrub and the vine scrub already mentioned are likely, in season, to produce and harbour native fruits suitable for the local development of fruit-fly maggots; and, negative evidence of such occurrence being alone forthcoming, it is proposed to again visit them during, say, next October.

The close proximity of many of the neglected and abandoned orchards inspected in New South Wales to the Stanthorpe district (in some cases distant not more than 10 miles—*e.g.*, Marylands, Liston, and Wylie's Creek), would, in my opinion, probably result in their proving a source of fruit-fly infestation to the Granite Belt area of Queensland. Fruits such as plum, peach, and apple maturing, as they do in the above districts, somewhat earlier than similar fruits in the Granite Belt, it is quite possible that fruit flies developing from maggots in these fruits over the border might easily find their way (aided, it may be, by favouring winds) into the Stanthorpe area. In order to ascertain if this be the case, it is my intention to carry out experiments in this direction early in the coming season. Large numbers of fruit flies can be bred in the insectary, if then available, and after being suitably marked, can be transferred to varying distances and liberated, the range being extended as results, ascertained by recaptures, dictate.

[*Note.*—We are indebted to Dr. Spencer Roberts, of Stanthorpe, for bringing to our notice the vine scrub referred to above; and, moreover, for the very material help he afforded us, too, throughout the investigation.]

COLD STORAGE AND FRUIT FLY.

While on leave of absence in Brisbane, a letter was received from Mr. A. H. Paget, The Summit, requesting the examination of a case of apples (variety, Ben Davis) then in cold storage, and which had been already submitted to a temperature of 38 deg. Fahr. for a period of seven weeks. Being at the time unable to attend to the matter myself, Mr. H. Tryon, Government Entomologist and Pathologist, kindly made an examination of them for me, and reported as follows:—

- (1) It was possible to detect in those apples examined that they had been punctured by fruit fly, but these punctures were so inconspicuous not to compel the attention of the ordinary buyer of fruit.

[*Note.*—Four apples in the top layer of the case exhibited more or less decay. In three of these, case injury had operated, and the remaining one exhibited *bitter rot*.]

- (2) Connected with the punctures were slender tunnelings—sometimes branched, extending inwards from four-tenths to seven-tenths of an inch, rarely to one inch. These were obvious since their walls had become brown (chemical change), and not because they had proved sites of decay, since this decay, which ordinarily happens with fruit-fly attack, was absent. In fact, the injuries remarked had to be looked for rather than being obvious, and were scarcely material.
- (3) No fruit-fly eggs were discoverable, and wherever fly maggots occurred these were quite small, and had evidently not been long hatched.
- (4) Every maggot was found dead and shrunken; the fact of death being very evident owing to the dark colour acquired. Their small size points to very brief duration as living maggots, on once being submitted to cold storage conditions.
- (5) Except those fruit abovementioned as decayed, to a greater extent the fruit had kept all right. As packed, it was sound and marketable.

Mr. Tryon further added—

“This last statement as to condition of fruit is the pronouncement of the Director of Fruit Culture, Mr. A. H. Benson, who concurs with me, and in concluding also that bitter pit was present in several of the apples, may have become more noticeable during the period of storage; and, as consequence of it, others have testified also as to the soundness and lack of evident injury of the apples in question.

"It may be concluded from this examination that apples of the kind represented in the experiment may remain free from fruit-fly attack, almost up to the time that they are ready for being harvested; that fruit-fly maggots (and eggs) present in them can be killed, on their having been gathered, by submission of the apples to cold storage; and that the amount of injury developed be dependent, in any one apple variety, on the time elapsing between gathering and submission to this process."

The foregoing statement, testifying as it does to the efficacy of cold storage conditions in destroying the eggs and young maggots of the fruit fly before material damage has been effected, and also to the consequent soundness and marketable quality of the fruit subjected to them, should undoubtedly prove of very great value to all who are interested in this important question.

SUPPOSED FRUIT-FLY MAGGOTS.

Maggots about half grown and bearing a rather close general resemblance to those of the fruit fly (*B. Tryoni*) were recently submitted to this Office by Mr. B. Wilson, of Cotton Vale. These maggots had been discovered in cow dung under the following circumstances:—Large quantities of maggot-infested apples had been, it was stated, fed to the cattle yielding this excrement, and this saved, with intention, presumably, of examination for indication of the possible presence of living fruit-fly larvæ or pupæ therein. On being examined in this Office the maggots in question proved to be those of one of our common muscid flies (Fam. *Anthomyiæ*) and not, as was supposed, the maggot of the Queensland Fruit Fly (*B. Tryoni*).

Another instance of maggots similarly mistaken for those of the fruit fly was supplied by specimens tendered by Mr. D. Taggart, of The Summit. These maggots were found in rotting apples that had been missed in the harvesting and were lying under the orchard trees; these apples, moreover, had been subjected to a good many very severe frosts, but in spite of this the maggots which they contained were still alive and active. The situation in which the insects were found, and their general colour and size, led, as might be naturally expected, to their being mistaken for fruit-fly maggots. On examination, however, they proved to be the interesting maggot form of one of the large family of flies known as the *Syrphidæ*. Certain species of flies of this group breed only in vegetable matter reduced to a semi-liquid or liquid state through decay, and so are not responsible for any injury to fruit or vegetables. Other syrphid flies, again, are in many instances the good friends of the orchardist, feeding, as certain species do, on aphides or plant lice.

RED MITE.

Red Mite (*Bryobia* sp.) is in the egg stage very noticeable in many orchards at the present time. Trees harbouring their eggs look as if they had been painted with hands of pink and light-red colour. A portion of this encrusting matter, on being examined with a lense, will be seen to be composed of large quantities of minute ova. These eggs (about $\frac{1}{4}$ mm. in diameter) are laid adjacent to one another, on the trunk and lower branches of the tree, any wrinkles in the bark being generally filled with them. Not only are they thus laid on the bark of the tree, but also on and within the ground at the base of it, and so, on turning over the small lumps of soil here, hundreds of these eggs will be seen covering the under surfaces and packed away in every crevice between and within them.

Although not credited with doing very much harm, it is extremely probable that, should these mites multiply unchecked, their attacks would have a very injurious effect on the host tree. The usual winter spraying, practised by most orchardists here, should prove effective in destroying the eggs of this mite, where present; or, rather, the young on issuing from them. Micible oil sprays might be used against them with success also.

CONCLUDING REMARKS.

As will be seen from the foregoing report, much of the period embraced therein has been occupied by investigations away from Stanthorpe and by the annual leave.

It is hoped that before the fruit season opens the station here will have been equipped with a suitable insectary, a provision that is almost indispensable to the successful carrying out of projected experiments.

I am again indebted to many orchardists and others (particularly so to Mr. D. Taggart, The Summit, and to Mr. W. B. Wilson, Cotton Vale) for interesting specimens and material received. It is very gratifying to note the keen interest which is being taken in all matters pertaining to the control of the fruit fly in the Stanthorpe district.

Orchard Notes for September.

THE COAST DISTRICTS.

September is a busy month for the fruitgrowers in the coastal districts of this State, as the returns to be obtained from the orchards, vineyards, and plantations depend very largely on the trees, vines, and other fruits getting a good start now.

In the case of citrus orchards—especially in the Southern half of the State—it is certainly the most important month in the year, as the crop of fruit to be harvested during the following autumn and winter depends not only on the trees blossoming well but, what is of much more importance, that the blossoms mature properly and set a good crop of fruit.

This can only be brought about by keeping the trees healthy and in vigorous growth, as if the trees are not in this condition they do not possess the necessary strength to set their fruit, even though they may blossom profusely. The maintenance of the trees in a state of vigorous growth demands—first, that there is an adequate supply of moisture in the soil for the requirements of the tree; and, secondly, that there is an adequate supply of the essential plant-foods available in the soil.

With respect to the supply of moisture in the soil, this can only be secured by deep and systematic cultivation, excepting in seasons of good rainfall or where there is a supply of water for irrigation. As a rule, September is a more or less dry month, and when it is dry there is little chance of securing a good crop of fruit from a neglected orchard.

If the advice that was given in the Notes for August regarding the conservation of moisture in the soil has been carried out, all that is necessary is to keep the soil stirred frequently, so as to prevent the loss of moisture by surface evaporation. If the advice has been ignored, then no time should be lost, but the soil should be brought into a state of good tilth as quickly as possible.

Where there is a supply of water available for irrigation, the trees should receive a thorough soaking if they require it. Don't wait till the trees show signs of distress, but see that they are supplied with an adequate supply of moisture during the flowering and setting periods.

It is probable that one of the chief causes why navel oranges are frequently shy bearers in the coastal districts is that the trees, though they produce a heavy crop of blossoms, are unable to set their fruit, owing to a lack of sufficient moisture in the soil at that time, as during seasons when there is a good rainfall and the trees are in vigorous growth or where they are grown by irrigation, as a rule they bear much better crops. The importance of maintaining a good supply of moisture in the soil is thus recognised in the case of this particular variety of citrus fruit.

When the trees show the want of sufficient plant-food—a condition that is easily known by the colour of the foliage and their weekly growth, the orchard should be manured with a quick-acting, complete manure; such as a mixture of superphosphate, sulphate of ammonia, and sulphate of potash, the plant-foods in which are soluble in the water contained in the soil and are thus readily taken up by the feeding roots.

Although the above has been written mainly in respect to citrus orchards, it applies equally well to those in which other fruit trees are grown. Where the land has been prepared for bananas, planting should take place during the month. If the plantation is to be made on old land, then the soil should have been deeply ploughed and subsoiled and brought into a state of perfect tilth prior to planting. It should also receive a good dressing of a complete manure, so as to provide an ample supply of available plant-food. In the case of new land, which has, as a rule, been scrub that has been recently fallen and burnt off, the first operation is to dig the holes for the suckers at about 12 ft. apart each way. Good holes should be dug and they should be deep enough to permit the top of the bulb or corm of the sucker to be 6 in. below the surface of the ground.

Take great care in the selection of the suckers, and see that they are free from beetle borers or other diseases.

As a precaution it is advisable to cut off all old roots and to dip the corms for two hours in a solution of corrosive sublimate, made by dissolving 1 oz. of this substance in 6 gallons of water.

In old banana plantations keep the ground well worked and free from weeds and remove all superfluous suckers.

Where necessary, manure—using a complete fertiliser rich in potash, nitrogen, and phosphoric acid, such as a mixture of meatworks manure and sulphate of potash, 4 of the former to 1 of the latter.

Pineapples can also be planted now. The ground should be thoroughly prepared—viz., brought into a state of perfect tilth to a depth of at least 1 ft., more if possible—not scratched, as frequently happens; and when the soil requires feeding, it should be manured with a complete manure, which should, however, contain no superphosphate.

Old plantations should be kept in a good state of tilth and be manured with a complete fertiliser in which the phosphoric acid is in the form of bones, basic phosphate, or finely ground phosphatic rock, but on no account as superphosphate.

The pruning of custard apples should be carried out during the month, leaving the work, however, as late in the season as possible, as it is not advisable to encourage an early growth, which often means a production of infertile flowers. If the weather conditions are favourable, passion vines can also be pruned now, as if cut hard back they will make new growth that will bear an autumn crop of fruit instead of one ripening during the summer.

Grape vines will require careful attention from the time the buds start, and they should be regularly and systematically sprayed from then till the time the fruit is ready to colour with bordeaux mixture, in order to prevent loss by downy mildew or anthracnose.

Where leaf-eating beetles, caterpillars, or other insects are present, the trees or plants on which they are feeding should be sprayed with arsenate of lead. All fruit-fly infested fruit must be gathered and destroyed and on no account be allowed to lie about on the ground, as, if the fly is allowed to breed unchecked at this time of the year, there is very little chance of keeping it in check later in the season.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Where not already completed, the winter spraying with lime-sulphur should be finished as early in the month as possible. Black aphid should be fought wherever it makes its appearance by spraying with a tobacco wash, such as black-leaf forty, as if these very destructive insects are kept well in hand the young growth of flowers, leaves, wood, and fruit will have a chance to develop. Woolly aphid should also be systematically fought wherever present, as once the trees are in leaf it is much more difficult to treat.

The working over of undesirable varieties of fruit trees can be continued. The pruning of grape vines should be done during the month, delaying the work as long as it is safe to do so, as the later the vines are pruned the less chance of their young growth being killed by late frosts. Keep the orchards well worked and free from weeds of all kinds, as the latter not only deplete the soil of moisture but also act as a harbour for many serious pests, such as the Rutherglen bug.

Grape vines should be swabbed with the sulphuric acid solution, mentioned in the Notes for August, when the buds begin to swell and just before they burst, as a protection against black spot and downy mildew.

New vineyards can be set out, and, in order to destroy any fungus spores that may be attached to the cuttings, it is a good plan to dip them in bordeaux mixture before planting. The land for vines should be well and deeply worked, and the cutting should be planted with one eye only out of the ground and one eye at or near the surface of the ground.

In the warmer parts which are suitable for the growth of citrus fruits, the land must be kept well cultivated, and if the trees need irrigating they should be given a good soaking, to be followed by cultivation as soon as the land will carry a horse without packing.

In these parts fruit-fly should be systematically fought, as it will probably make its appearance in late citrus fruits and loquats; and if this crop of flies is destroyed, there will be every chance of the early crops of plums, peaches, and apricots escaping without much loss.

Farm and Garden Notes for September.

With the advent of spring, cultivating implements play an important part in farming operations.

The increased warmth of soil and atmosphere is conducive to the growth of weeds of all kinds, particularly on those soils that have only received an indifferent preparation.

Potatoes planted during last month will have made their appearance above the soil, and where doubt exists as to their freedom from blight, they should be sprayed with either Burgundy or Bordeaux mixture as soon as the young leaves are clear of the soil surface.

Land which has received careful initial cultivation and has a sufficiency of sub-surface moisture to permit of a satisfactory germination of seeds may be sown with maize, millets, panicum, sorghums, melons, pumpkins, cowpeas, broom millets, and crops of a like nature, provided, of course, that the areas sown are not usually subjected to late frosts.

Rhodes grass may be sown now over well-prepared surfaces of recently cleared forest lands or where early scrub burns have been obtained, and the seed is sown subsequent to showers. More rapid growths, however, are usually obtainable on areas dealt with, say, a month later.

In connection with the sowing of Rhodes grass, farmers are reminded that they have the Pure Seeds Act for their protection, and in Rhodes grass, perhaps more than any other grass, is it necessary that seed of good germination only should be sown. A sample forwarded to the Department of Agriculture will elicit the information free of cost as to whether it is worth sowing or not.

Where the conditions of rainfall are suited to its growth, paspalum may be sown this month.

The spring maize crop, always a risky one, requires to be sown on land which has received good initial cultivation and has reserves of soil moisture. Check-row seeding in this crop is to be recommended, permitting as it does right-angled and diagonal cultivation by horse implements, minimising the amount of weed growth, and at the same time obtaining a soil mulch that will, with the aid of light showers, assist to tide the plant over its critical period of "tasselling."

Although cotton may be sown this month, it usually stands a better chance if deferred until October. The harvesting of cotton during the normal rainy season is, if possible, to be avoided.

The sowing of intermediate crops prior to the preparation of land for lucerne sowing should be carried out in order that early and thorough cultivation can take place prior to the autumn sowing.

The following subsidiary crops may be sown during the month:—Tobacco and peanuts, plant sweet potatoes, arrowroot, sugar-cane, and cow cane (preferably the 50-stalked variety), and in those districts suited to their production yams and ginger. Plant out coffee.

KITCHEN GARDEN.—Now is the time when the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing many kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost. Manure for the garden during summer should be in the

liquid form for preference. Failing a sufficient supply of these, artificials may be used with good results. Dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and in the latter case, stir the soil early next day to prevent caking. Mulching with straw, leaves, or litter will be of great benefit as the season becomes hotter. It is a good thing to apply a little salt to newly dug beds. What the action of salt is, is not exactly known, but when it is applied as a top dressing it tends to check rank growth. A little is excellent for cabbages, and especially for asparagus, but too much renders the soil sterile, and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow Guada bean, providing a trellis for it to climb on later. Sow cucumbers, melons, marrows, and squash at once. If they are troubled by the red beetle, spray with Paris green or London purple. In cool districts, peas and even some beetroot may be sown. Set out egg plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem, either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, chicory, eschalots, cabbage, radishes, kohl-rabi, &c. These will all prove satisfactory, provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

CERTIFICATES OF SOUNDNESS.

Certificates of Soundness as under-listed were issued in the course of July, 1922:—

Name of Stallion.	Breed.	Period for which Certificate issued.	Owner's Name.	Owner's Address.
Prince ..	Draught ..	Life ..	G. L. Petersen	Oakenden
Nelson ..	Draught ..	Life ..	A. M. Johnson	Blythe Farm, Grace- mere
Silvers Royal	Draught ..	12 months	A. M. Johnson	Blythe Farm, Grace- mere
Prince of Inver- may	Clydesdale ..	12 months	J. McAllister ..	Forest Hill
Pride of the Valley	Draught ..	12 months	F. Zischko ..	Glencoe Grove, Forest Hill
Lochinvar ..	Clydesdale ..	12 months	D. C. Griffiths ..	Mount Forbes
Prospector ..	Clydesdale ..	12 months	Dept. of Agricul- ture and Stock	Gatton College, Gat- ton
Mauvenhoff ..	Thoroughbred	Life ..	J. Dalton ..	Ellensfield, Nebo
Windsor ..	Thoroughbred	Life ..	B. J. McGuire ..	Mackay
Malt Bush ..	Thoroughbred	Life ..	A. Shannon ..	Salt Bush Park, St. Lawrence
King-o'-Malt	Blood ..	Life ..	P. J. Frawley ..	Strathpine
Eudois ..	Blood ..	Life ..	Messrs. Neilson and Murphy	Flinders st., Towns- ville
Pah King ..	Blood ..	Life ..	F. Smith ..	Townsville
Brown Lad ..	Blood ..	Life ..	H. Jannusch ..	Haden
Metro ..	Blood ..	12 months	W. Inglo ..	Eumundi
Major Marcus	Trotter ..	Life ..	Rees Thomas Ltd.	Townsville
Master Cole ..	Trotter ..	12 months	W. Abrahams ..	Glanmorgan Vale
Sir Butler ..	Pony ..	Life ..	F. Bell ..	Bolsover st., Rock- hampton
Joker ..	Pony ..	Life ..	Mrs. A. L. Mackay	Pinnacle, Mackay
Trafalgar ..	Pony ..	Life ..	C. Shepperd ..	Mackay
Dandy's Pride	Pony ..	Life ..	B. J. McGuire ..	Mackay
Pinto Ben ..	Pony ..	Life ..	J. O'Sullivan ..	Excelsior Hotel, Rockhampton
Black Pastal ..	Pony ..	Life ..	H. Arndt ..	Tallegalla
Brownie ..	Pony ..	Life ..	J. H. Ruhwedel	Murphy's Creek

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1922.	JULY.		AUGUST.		SEPTEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6:45	5:6	6:36	5:20	6:7	5:37
2	6:45	5:6	6:35	5:21	6:6	5:38
3	6:45	5:7	6:35	5:21	6:5	5:38
4	6:45	5:7	6:34	5:22	6:4	5:38
5	6:45	5:8	6:33	5:23	6:3	5:39
6	6:45	5:8	6:32	5:24	6:2	5:39
7	6:45	5:9	6:31	5:24	6:1	5:40
8	6:45	5:9	6:30	5:25	6:0	5:40
9	6:44	5:10	6:29	5:26	5:58	5:41
10	6:44	5:10	6:28	5:27	5:57	5:41
11	6:44	5:10	6:28	5:28	5:56	5:42
12	6:44	5:11	6:27	5:28	5:55	5:42
13	6:43	5:11	6:26	5:29	5:53	5:43
14	6:43	5:12	6:25	5:29	5:52	5:44
15	6:43	5:12	6:24	5:30	5:51	5:45
16	6:42	5:13	6:23	5:30	5:50	5:45
17	6:42	5:13	6:22	5:31	5:49	5:46
18	6:42	5:14	6:21	5:31	5:48	5:46
19	6:41	5:14	6:21	5:32	5:47	5:46
20	6:41	5:15	6:20	5:32	5:46	5:46
21	6:41	5:15	6:19	5:32	5:44	5:46
22	6:40	5:16	6:18	5:33	5:43	5:47
23	6:40	5:16	6:17	5:33	5:42	5:47
24	6:39	5:17	6:16	5:34	5:41	5:47
25	6:39	5:17	6:15	5:34	5:40	5:48
26	6:38	5:18	6:14	5:35	5:39	5:48
27	6:38	5:18	6:13	5:35	5:38	5:49
28	6:37	5:19	6:12	5:36	5:37	5:49
29	6:37	5:19	6:11	5:36	5:36	5:50
30	6:36	5:20	6:10	5:37	5:35	5:50
31	6:36	5:20	6:9	5:37	...	...

PHASES OF THE MOON, OCCULTATIONS, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer Time" is not used.

		H. M.
2 July	(First Quarter	8 52 a.m.
9 "	○ Full Moon	1. 7 p.m.
17 "	☾ Last Quarter	3 11 p.m.
24 "	☾ New Moon	10 47 p.m.
31 "	(First Quarter	2 22 p.m.

Apogee on the 15th at 3.24 a.m.

Perigee on the 27th at 1.30 a.m.

About 8 o'clock in the evening of 29th July the apparent nearness of the Moon and the giant planet Jupiter low down in the west will form a very interesting spectacle; there will be an occultation of Jupiter about 9 o'clock.

8 Aug.	○ Full Moon	2 19 a.m.
16 "	☾ Last Quarter	6 46 a.m.
23 "	☾ New Moon	6 34 a.m.
29 "	(First Quarter	9 55 p.m.

Apogee on the 11th at 6.54 p.m.

Perigee on the 24th at 5.42 a.m.

During the evenings of 14th, 15th, and 16th August the planets Venus and Saturn will, with Eta Virginis, a second magnitude star, form an interesting group in the north-west.

6 Sept.	○ Full Moon	5 47 p.m.
14 "	☾ Last Quarter	8 20 p.m.
21 "	☾ New Moon	2 38 p.m.
28 "	(First Quarter	8 40 a.m.

Apogee on the 8th at 4.12 a.m.

Perigee on the 21st at 3.36 p.m.

About 3 o'clock on the afternoon of 30th September a pair of binoculars should afford a view of the Moon and a third magnitude star—Beta Capricorni. In the course of an hour the star may be seen in a small telescope to disappear suddenly on the eastern side of the Moon and reappear on its western side.

The planet Venus will be at its greatest height in the western sky on 15th and 16th September.

The Great Australian Solar Eclipse will occur on 21st September between a few minutes after 3 p.m. to about a quarter past 5.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

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PART. 3.

THE GREAT SOLAR ECLIPSE.

By D. EGLINTON, F.R.A.S.

Written especially for the "Queensland Agricultural Journal."

All dwellers upon the land, and especially those who seldom or never see a picture show, should look forward to and make every possible preparation to observe the Great Solar Eclipse which will occur in the afternoon of Thursday, 21st September. Of all the grand phenomena of Nature none exceeds the magnificent spectacle which a total eclipse of the sun affords. It will be only in certain parts of Australia, of which Queensland in its southern portion will have a large share, that the full grandeur of totality will be observable; but more or less of the eclipse of the sun will be seen from every part of our island continent where the sky in the direction of the sun is free from clouds.

The places in Queensland where totality will occur—that is, where the moon will entirely cover every bit of the sun's face—lie between Beaudesert and Grafton on the east coast, and between Beetoota and Oontoo in the south-west. Whether the inhabitants of these two western towns will actually get the full effects of totality or, like Southport and Glen Innes, will have merely a very near approach to it, is somewhat doubtful. It will be of much interest if careful observations are made at both these western towns to enable this point to be decided. If the last scrap of the sun's brilliant surface disappears, there will be a momentary chance of seeing some of the great red prominences which occasionally leap out for many thousands of miles, and even the corona which extends much further from the sun, either completely surrounding it or noticeable in wide bands or streaks varying considerably at different total eclipses. At such places as Stanthorpe, St. George, Coongoola, Toompine, and the north-east corner of Durham Downs, the total phase will last for about three minutes, and the grandest features of the eclipse should be very well seen if favourable weather conditions prevail.

Those persons who are situated north of a line which can be drawn on a map through Beaudesert and Beetoota, or south of a line through Grafton and Oontoo, should go a few miles further south or north, as the case may be, to get well into the path of totality—a belt of land about 115 miles wide, between the two lastmentioned lines. Midway between them, on the central line which runs through Casino on the east coast and passes westwards about 4 miles south of Stanthorpe and the same distance north of Goondiwindi and south of Coongoola, will indicate the best positions for viewing the great phenomenon.

Heights, such as Stanthorpe affords, where there is a wide view of the landscape westwards and eastwards, form the best positions from which observers may see the great weird shadow cast by the moon rush towards them at a great speed. Then it will be quite safe to look up at the sun without coloured or smoked glass, which, however, should be provided to watch the first indication of the moon's encroachment. This will be about 3 o'clock in the afternoon; then for a little more than an hour it will

be interesting to notice through coloured (red and green combined) or smoked glass, the round face of the sun undergo the changes in shape which are presented by the moon each month between its phases from full to new, and vice versa for an hour or more after totality. More or less of this will be noticeable all over Australia, but to a very limited extent in far north-east or south-west. Only within, and perhaps near, the path of totality, will the strange shadow-bands be seen to flit over the landscape a little before totality takes place.

In the favoured zone, observers (men, women, and children—none should lose this splendid opportunity) should be careful to prevent their eyes being too much affected by glare so as to make them incapable of seeing the corona which can be seen to the best advantage by those who remain blindfolded for a few minutes beforehand. In his splendid popular work on astronomy, "The Story of the Heavens," the late Sir Robert Ball mentions that when the sky is clear during a total eclipse of the sun, the moon appears of an inky darkness, not like a screen, but like the huge black ball that it really is.

The sun and the moon are apparently about the same size. A threepenny piece held out at arm's length is apparently bigger than either, but Sir Robert Ball tells us that if the sun were cut up into a million pieces, each would be larger than the earth, and that "if the earth were cut into fifty pieces all equally large, then one of those pieces rolled into a globe would equal the size of the moon." Therefore the sun is more than 50,000,000 times the size of the moon. The comparative nearness of the moon to the earth and the enormous distance (fortunately) of the sun, of course, account for the apparent similarity in size. When, however, the eclipse takes place at the time of our spring equinox, the moon will look bigger than the sun, because it will be in that part of its slightly elliptical orbit, which brings it in perigee.

Thus a combination of favourable circumstances will give this occasion more than ordinary value for scientific purposes: one of which is to obtain for a second time a test of the correctness of Einstein's Relativity Theory of Gravitation. On the last occasion, when the apparent positions of stars which seemed to be nearly in a line with the sun during a total eclipse in 1919 were compared with positions photographed after the sun had moved from that position, sufficient evidence was afforded to fairly prove that Einstein is right. The rigid exactions of science make this second test one of considerable importance for that purpose alone. There are other reasons, such as obtaining more information on the nature of the sun's corona. Mrs. Todd, in her famous little book on Total Eclipses of the Sun, says, "It is told of the late Professor Snell, of Amherst College, that he once asked for a definition of the solar corona from a member of his class in Astronomy, who after a good deal of hesitation, and feeling desperately on the brink of utter failure, plunged into the statement that he *did* know what the corona was, but had forgotten. 'What an incalculable loss to science!' said the Professor, with characteristic humour; 'the only man who ever knew what the sun's corona is, and he has forgotten!'"

Although as an average there are about seventy total eclipses of the sun in a hundred years, their infrequency at any particular place, such as London, is remarkable, a period of over eight centuries having elapsed without one. Yet at the small island, Blanquilla, in the Caribbean Sea, south of the Leeward Islands, two total eclipses were visible in the short space of three years, and it is probable that the total solar eclipse of 10th September, 1923, will be seen there also; in any case it will be visible as a very fine eclipse of the sun. So that it will be seen that eclipses, like kisses, go by favour.

During the total phase of our coming eclipse, which there is some reason to expect will be a *dark* one, the planets Saturn, Mercury, Jupiter, and Venus will be visible on the eastern side of the sun, Saturn being nearest (within two diameters of the moon), Mercury and Jupiter rather close together, but about as far from Saturn as it will be from the sun; then Venus, the most brilliant, about as far from Jupiter. Only those situated within the path of totality will be likely to see all these.

THE PHYSIOGRAPHY OF NORTHERN AUSTRALIA.—I.

By DR. H. I. JENSEN, Geological Survey, Brisbane.

In this contribution I propose to give my own observations on Soils and Physiography in Queensland, and to Supplement observations made by myself and colleagues, Messrs. Gray and Winters, in the Northern Territory.

THE NORTHERN TERRITORY.

LITERATURE DEALING WITH N.T. PHYSIOGRAPHY.

1. Memoir No. 1, Advisory Council of Science and Industry, entitled, "The Australian Environment," by Dr. Griffith Taylor.

2. Bulletin No. 10 of The Northern Territory, published by the Commonwealth Department of Home and Territories, "Geological Report on the Darwin Mining District, the McArthur District, in the Barkly Tablelands," by Dr. Dr. H. I. Jensen, Chief Geologist.
3. Bulletin No. 14 (of the N.T.), "Report on the Country between Pine Creek and Tanami," by Dr. Jensen; "Reconnaissance of North West Arnhemland," by G. J. Gray, B.E., BSc.; "Observations on the Country between Pine Creek and Newcastle Waters," by R. J. Winters, F.G.S.
4. Bulletin No. 16 (of the N.T.), "The Geology of the Waggaman Province," by Dr. H. I. Jensen, G. J. Gray, and R. J. Winters.
5. Bulletin No. 19 (of the N.T.), "Report on the Geology of the Agicondi Province," by Dr. H. I. Jensen.

Much information briefly descriptive of Territory Physiography can be obtained from the foregoing.

The following are the principal points to be noted:—

1. The Northern Territory is a peneplain elevated in the Cainozoic period. Elevation commenced after the deposition of the Cretaceo-Eocene belemnite bearing beds. It has been a slow movement and persists even to the present day, except in the extreme north-east corner of the Territory, the English Company Islands, and the Carpentaria coast from Cape Wilberforce to Cape Gray.

2. The Northern Territory has undergone no compressional earth movements since the early Palæozoic period. Even Cambrian rocks are but slightly folded. Movements have been of the vertical, isostatic type. Late Palæozoic (Permo-Carboniferous) and Mesozoic rocks have been laid down during periods of marine transgression.

3. Evidences of Cainozoic uplift are obtained in the form of raised beaches on the west coast, in Tertiary beds and raised beaches on the north coast, and in raised beaches and in the advance of *Casuarina glauca?* over the mangroves. (*Rhizophora* species) on the Gulf of Carpentaria coast south of Blue Mud Bay. Evidence of uplift can also be got in the nature of the river channels. The rivers are cutting down and in many places show distinct terraces. In places great canons have been cut, as in the case of the Upper Katherine and the McArthur Rivers, between Borroloola and McArthur Station. The principal rivers prior to the uplift and during the early stages of the uplift flowed north, but the present day principal drainage direction is east and west. Great river captures have been effected.

4. Climatically and in vegetation the Territory can be divided into three zones—

(A) *Coastal Plain*.—Sedimentary rocks and metamorphics alike on this zone capped with laterite, which is disintegrating owing to increasing moisture of climate. Rainfall, 45 to 65 inches in heavy tropical falls during wet months. Country lightly timbered with *Eucalyptus grandifolia*, *E. papuana*, *E. miniata*, *E. tetradonta*, *E. terminalis* and numerous species of *Acacia* (*A. auriculiformis*, *A. holosericea*, &c.), *Grevillea*, *Hakea*, *Careya* (cockatoo apple), *Buchanania*, *Gardenia*, *Eugenia*, *Alstonia*, &c. The soils are mostly very poor, and covered in the wet season with a dense growth of innutritious reed-like grasses, which should make good paper pulp, and grow to a height of from 6 to 14 feet. Whiteant (termite) nests abound, and in patches are of the "magnetic" variety—that is, flat structures elongated in the magnetic north-south direction. Tea Tree (*melaleuca*) swamps are abundant. The coast is fringed with mangrove (*Rhizophora*, &c.).

(B) *The Hill Country* usually from 100 to 200 miles from the coast but hugging the coast closer in the north-west and west. The metamorphic rocks and granites are dissected into rough hills, on many of which occur cappings (mesas) of table sandstone. These mesas are often capped with laterite which was once co-extensive with the coastal laterites. The rainfall ranges from 20 to 45 inches per annum. The vegetation consists of stunted forest in which *Eucalyptus alba* is a prominent member. Besides *Eucalyptus alba*, we have *E. Foelschiana*, *E. Spenceriana*, *E. latifolia*, *E. grandifolia*, *E. phanicia*, *E. tetradonta*, *E. miniata*, *E. setosa*, *E. clavigera*, *E. dichromophloia*, *E. houseana*, *E. microtheca*, *E. ptycophylla*, and *E. melanophloia*. (This species has the character of a box except in the Wandj district, where is it an ironbark.*) We have also ironwood (*Erythrophloeum Labouchei*), *Calythrix*, *Verticordia*, *Acacia Bidwilli*, *Acacia holosericea*, *A. tumida*, *A. latifolia*, and many other

*Mr. J. H. Maiden, who is monographing the genus *Eucalyptus*, writes me that he is making a new species of this ironbark.

wattles. This belt is, however, typically the poplar gum (*E. alba*) belt, since on all alluvial flats *E. alba* is dominant. Stringybark (*E. tetradonta*) is typical principally of the most sandy, poor soils. A common wood in very sandy country is also quinine (*Petalostigma quadriloculare*), kapok (*Bombax malabaricum* (?).)

The soils are mostly poor. The grasses are better than on the coast, but cannot be called good feed for stock. "Magnetic" white ant nests are not met with, but the termite nests are of large size.

As we pass over on to the interior slopes the mesas of sandstone become clad with lancewood (*Acacia deratoxylon*), and belts of pine (*Callitris calcarata*).

(c) *Inland Arcas*.—These areas are roughly divisible into—

(a) Plains, with rich black soils of limestone derivation and covered with Mitchell and Flinders grass, blue grass and blue bush. No forest trees are seen at all over large areas, but where trees occur the dominant timber is Bauhinia. Nutwood (*Grevillea gibbosa* (?)) belts also occur, also patches of *Eucalyptus pruinosa*, and along the watercourses mulga (*Acacia aneura*), gidgee (*Acacia cambagei*), and gutta-percha (*Excaccaria parvifolia*). Right in the midst of the blacksoil plains an occasional clump of whitewood (*Alstonia constricta* (?)) may be met with.

The plains country is the pick of the Territory from the pastoralists' viewpoint, but surface waters are scarce, although on the coastal fall most of the Victoria River basin is climatically and physiographically a part of the "Inland Area."

(b) *Desert Country*.—This is the local name for wooded poor country, such as occurs on sandstone, metamorphic, and granite areas. The grasses are useless for stock. The principal stock feed in the "desert" belts is bush, the leaves of hakea, cappariz, &c. Occasional permanent billabongs are found, whereas the plains are destitute of natural waters, and rely on the subartesian.

The vegetation is a mixture of desert gum, mallee, wattle (*acacia*), wild orange (*capparis* sp.), emubush, beefwood (*hakea*), quinine (*petalostigma*), and other dry country genera.

The Eucalypts met with are solely of the desert type—*E. aspera*, *E. eudesmioides*, *E. pyriformis*, *E. oleosa* (?), *E. gamophylla*, *E. salmonophloia* (?), *E. macrocarpa*, *E. peltata*, *E. tetragona*, *E. salubris*, *E. odontocarpa*, *E. ptychocarpa*, and so on. In the Victoria River Country, West Australian types occur; in the Barkly Tableland, Queensland types.

White ant nests occur only in the desert areas. Flies are bad on the plains in the wet season.

The Coastal and Hill Country is tick infested, but the inland country is tick free.

A much fuller description of the country, and of the vegetation is given in a paper written by the writer in 1916, but which is still unpublished, as I left the Federal Government service soon after, and the report was too long and detailed to expect a scientific society to print. Besides a large number of maps illustrating the physiography were necessary, and I have not had time or the facilities since to finish this work.

5. The extreme north-east of the Territory is a subsiding area, as shown in Bulletin No. 10 of the Northern Territory.

6. The climate of the Territory seems to be growing wetter, as evidenced by the erosion and disintegration of the laterites.

7. The Territory is essentially a mining and pastoral country. It is unsuited for agriculture even with irrigation. The soils of the Coast and Hill Belts are too poor and the inland soils too heavy, and in any case the engineering difficulties in the way of irrigation are almost insuperable, especially to obtain a water supply.

8. The inland flora is very rich in essential oils which may in time be the source of a payable industry. The coastal grasses should be useful for paper pulp manufacture. Spinifex (*Triodia*) is the most abundant grass on the desert country. Poison bush (*Gastrolobium*) occurs in patches. Rolypoly (*Salsola*) is also a common herb. Many of the acacias, grevilleas, and hakeas are extremely spinose—the leaves terminating in a sharp horny point. Setose leaves characterise many of the Eucalypts, and angular branches and grooved seedpods are also common features of the inland flora.

[TO BE CONTINUED.]

SUGAR : FIELD REPORTS.

The Southern Field Assistant (Mr. J. C. Murray) reports under date 11th August, 1922, as follows:—

In the course of the month the districts of Bundaberg (Woongarra and Barolin), Bingera, Gin Gin, Bucca, Avondale, Fairymead, and Childers have been visited.

Woongarra.—The crops here have improved greatly during the last month. A fair amount of cultivation is at present being done, in preparation for the spring planting. Growers should have successful strikes, for the soil is now in a moist condition. Provided deep cultivation takes place there should be enough moisture in the ground to last some months without rain. Of the staple varieties, probably 1900 Seedling is looking the best. Other canes showing well are H.Q. 285, H.Q. 426, Badila, E.K. 1, Shahjahanpur No. 10, Q. 970, Q. 1098, and Q. 813. There is a great need for the growers to show a continued and intelligent interest in the different cane varieties, as there is always the danger that the canes upon which they are depending will become diseased, or otherwise deteriorate. Each farmer should have a small plot set apart for experiments with fertilisers and different canes, on what he considers a piece of soil typical of the rest of his farm. Absolutely conclusive results would follow, and if on raising his cane varieties he found one particularly suited for his farm, he could gradually work it in to the main areas as a change, if not to entirely displace one of his staple varieties.

On the Woongarra soils growers are advised to use green maize as well as cowpea and Mauritius bean for green manuring. Even if allowed to mature, maize is a very beneficial rotation crop.

Barolin.—On this area the cane has greatly improved during the last couple of months. The farmers have some good crops to cut now, whereas about mid-autumn their chances looked very ordinary indeed. A few frosts have occurred here lately, but owing to the increased resistance of the cane and the moist nature of the soil, these did very little damage. Still, frosts may come again here when conditions are not so favourable, and growers are advised to observe their cane carefully with a view to determining which are the most resistant. The Shahjahanpur No. 10 is recommended to the farmers in this respect, this cane lately showing considerable promise where careful plant selection has been studied. Another variety that should do well on the Barolin soil as a spring plant crop is E.K. 1. It is probable here than early spring planting generally would be the most favourable for the growers. Careful consideration should be given by growers to fertilisation of these soils. Green manures that should be beneficial are cowpea, Mauritius beans, Soya beans, velvet bean, and maize. Should ratoons be shy, a light dressing of sulphate of ammonia or nitrate of soda would be beneficial.

Bingera.—The cane in this district looks very well. Growers are going to take off some heavy crops as, in common with other districts, the tonnages have greatly increased during the last six weeks.

Canes presenting a good appearance are D. 1135, 1900 Seedling, N.G. 16, Q. 813, Malagache, and D. 156.

The young plant cane looks very healthy, and should make good growth during the ensuing months. There appears to be a marked absence of parasites that inhabit the soil, also fungoid or bacterial parasites. This is no doubt due, in the latter cases, to careful plant selection, and in the former instance to checking by thorough cultivation. Positive fertilising results are being obtained by the use of meatworks manures, $\frac{1}{2}$ ton of bonedust per acre giving satisfactory results.

Gin Gin.—The farmers generally express themselves as satisfied with their prospects. The cane has responded wonderfully since the beginning of April. The farm drains and creeks are all running strongly, and everything indicates a good supply of sub-surface moisture to draw from during spring if the farmers can reach it by deep cultivation.

Varieties at present looking well are Black Innis, 1900 Seedling, and D. 1135. These three canes, especially the two latter ones, are the staple varieties, but the Demerara cane is rapidly losing its vigour. Growers should concentrate on experimenting with other varieties to displace this cane, for a period at least. In this respect it is recommended that they try Q. 813, E.K. 1, E.K. 28, and Q. 970. All these may be obtained at the distribution periods at the Bundaberg Sugar Experiment Station on application, if available. Black Innis is a variety that is doing well on the high forest loams, growing to good length and early maturity. More green manuring is being done now on the Gin Gin areas than hitherto. As an instance of

the depth of soil found on typical Gin Gin farms, one farmer is sinking a well at present and has already gone through 30 feet of pure volcanic soil. Water is expected at about 45 feet.

The importance of plant selection as a method of combating disease and preventing deterioration is again impressed upon the farmers.

Bucca.—A brief visit was made to Bucca in the course of the month. The cane here looks very healthy, and good tonnages should result. New land is being broken up and planted, as well as areas that have not been cultivated for a number of years. On soils such as these, that have been used only for grazing, methodical green manuring should be undertaken. Lime is essential now on most of the Bucca land; in fact, practically all the land on this section of the Kolan River would have its texture improved and a greater availability of potash would be created by liming.

The growers are recommended to obtain and experiment with varieties such as E.K. 1, E.K. 2, E.K. 28, H.Q. 285, and Q. 970.

Avondale.—An outstanding feature of the crops here is the healthy and heavy crop of D. 1135. If some of this cane growing on the light loams at Avondale could be used as plants on the volcanic soils, it would probably show great improvement. The farmers here are busy cutting.

Uba cane is giving good tonnages, and the results of this variety are satisfactory. Two other canes looking well here are Q. 813 and D. 1135 Sport.

Nut grass is not causing any serious concern here, the growers tending the cane carefully until a certain age, when it defeats this noxious weed.

The borer parasite has practically disappeared; very few growers complain of any infestation.

Fairymead.—The cane looks remarkably well, with healthy top indicating the absence of leaf disease or fungoid parasites. Crushing is at present proceeding satisfactorily. Owing to the completeness of the plantation equipment, good cultivation is always carried out, powerful tractors making the disturbing of the soil to considerable depth an easy matter. The company is also doing good work with a tractor of the caterpillar type at Springhill. This machine travels at the rate of about three miles per hour, and gets over a lot of ground.

Varieties giving good results at Fairymead at present are Uba and D. 1135, these two canes being the staple varieties. Some very good samples of H.Q. 283 are at present coming to the mill from Mr. Scotney's farm at Moorlands, a variety that the company intends to partially plant on their land at Childers.

Childers.—Good tonnages of cane are in evidence, the growers expecting a small reduction on the original estimate. 1900 Seedling and D. 1135 are the canes most frequently met with, but on some farms Q. 1098, 813, 907, N.G. 87, and H.Q. 77 are making a good showing. Very little disease is noticeable in the cane at present, and the grub is not expected to cause much loss during the coming year.

The growers are advised to practise changing of plants as much as possible, because this has proved, as the result of visiting hundreds of farms in Queensland, to be effective in maintaining a cane variety true to type and resistant to disease, provided careful selection is carried out. Fertilising is being carried out fairly generally in the Childers district. From an analysis of a typical scrub loam soil it would appear that a fertiliser consisting of 300 lb. sulphate of ammonia, 100 lb. potash, and 300 lb. bone meal per acre could be used to advantage. Dressings of sulphate of ammonia and nitrate of ammonia would probably be beneficial to backward ratoons. Good results have been obtained by a grower at North Isis by using 3½ cwt. bonedust per acre. This grower is increasing his application to 5 cwt. per acre. At present there is a great need in the Childers district for deeper cultivation, as there is a hard pan of earth formed on an average of about 10 inches below the surface which needs breaking. The mills are now in full swing with an adequate supply of efficient labour. No industrial disputes have arisen of any moment.

The Northern Field Assistant (Mr. E. H. Osborn) reports under date 8th August, 1922, as follows:—

Innisfail.—Upon my arrival in this district the weather conditions were unfavourable, as the rain then falling was accompanied by extremely cold winds. A fine spell set in early in the month, and harvesting operations were once again in full swing. Among the areas visited, some remarkably fine 17-months-old Badila was seen upon Mr. H. T. Stone's Daradgee farm. This land has not been under crop for a considerable time, and consists of a reddish to yellowish volcanic soil.

One of his paddocks is probably cutting at the rate of 55-60 tons of the acre, and in it is a Badila stool of twenty-six sticks showing nearly 8 feet of cane.

On Mr. C. McGowan's Daradgee farm some fine samples of cane of the newer varieties were seen.

Of these, H.Q. 458, E.K. 1, N.G. 16, and Q. 813 all show splendid growth for their age of 9 months. Mr. McGowan has gone to a great deal of trouble with his variety plant, and their vigorous growth reflects great credit upon him. In nearby paddocks consisting of heavier soils he is using both earth and burnt lime, and speaks well of the results.

Grubs have done very little damage to Daradgee so far this year, but borers were noticed in several scattered places. On Upper Daradgee probably some 7,000 tons of cane from new land will be handled by the mill this year. The land was formerly growing bananas, and the higher portions of each farm consist of red volcanic, whilst some fine alluvial flats fronting the river form the balance. The ground has been stumped and is now under the plough. This group of farms looks particularly well, and some splendid Badila is being cut upon them.

Mourilyan.—The cane generally seems rather on the light side, the result, doubtless, of too much continuous wet last year, and the dry spell that was experienced during the growing months of the year. Not many grubs were noticed, but borers were fairly evident. A fair quantity of manure is being used in this particular district. Unfortunately the excessive cost of lime makes its use nearly prohibitive to farmers.

South Johnstone.—As in the surrounding districts, the crops generally were inclined to be on the light side, but in parts some fine cane was noticed, especially some of the red-soil farms.

On Mr. Callow's farm at Japoon some of the varieties from the Experiment Station were comparing more than favourably with the local canes. The varieties in point were E.K. 28, H. 109, and H.Q. 458. The latter looked extremely well in this particular soil (stiff clayey alluvial). Applications for new varieties to the Experiment Station are very numerous.

The most grub-affected part is the 17-mile. Here they have done a fair amount of damage on several farms, but unfortunately borers are much more in evidence all through the district than in any former year. As previously mentioned, the chief cane grown is Badila, and the borers have attacked standover, plants, and first ratoons most impartially, and have practically done the same amount of damage to cane grown on the clayey alluvial flats as to that upon the red volcanic soils. Again, it cannot be emphasised too strongly how very important it is to use none but perfectly healthy plants free from borers, when planting. Any grower who is careless in this respect is only courting trouble.

Lower Burdekin.—Owing to the very light fall of rain in March, April, and May, totalling 1.28 in., the prospects of a large crop for 1922 were unfortunately dispelled. At the end of June and early in July, rain totalling 2.69 inches fell, and prospects brightened. Fresh life was put into the growing crops, and a large area of land was got ready for an early planting.

The several mills, four in number, were in full swing. Quite a lot of building was in progress, and not many unemployed seemed to be about.

Kalamia.—Although a portion of the first cane sent in to this mill was very low in density, it is steadily improving. Some of the cane looks very well, notably some green Goru (24B) from Mr. C. Butterworth's irrigated farm. This should be cutting at the rate of about 45 tons to the acre. Unfortunately the grubs seem to be extending their operations considerably. Last year where they were only in one or two isolated patches on the south-eastern side of Plantation Creek, they have now covered a far larger area on that side, and also are to be seen upon the opposite side of the creek. Probably the recent very dry spell has enabled the grubs to do more damage than in an average season. So far very few borers have been observed.

Pioneer.—As in most of the local mills a fair proportion of the early-cut cane sent in to Pioneer was very low in density, but at time of writing it is improving considerably. Some good-looking cane is going through the rollers, namely B. 208, Red and Green Goru, and Badila. All through the Pioneer area a lot of land is being prepared for planting, and in several places some really good young plant cane was seen, notably at Dick's Bank, upon Mr. J. N. Pringle's farm.

At the Lower Burdekin Show the cane exhibits were remarkably fine. An interesting feature of the cane section was a total of twenty-four varieties of cane shown by Mr. Jas. Mackersie, in his very fine one-man farm exhibit.

"In the c.c.s. tests the awards were—

Owner.	Variety.	C.C.S. Weight of Cane (3 Sticks.)		Pounds c.c.s. in Cane.	Place.
BADILA, H.Q 426, or B 208.					
Todd Bros. 	Badila ..	15.8	28 lb.	4.42	First
Pringle, J. N. 	B. 208 ..	17.8	23 ,,	4.09	Second
OTHER VARIETIES.					
Todd Bros. 	H.Q. 458 ..	1.32	38 lb.	5.01	First
Wellington, H. A. 	M. 1900 ..	13.6	28 ,,	3.80	Second

Home Hill.—The distribution of plants from the experimental plot on the State Farm was carried out on the 26th instant. The varieties most asked for were M.Q. 1 (Mowbray Seedling), Hybrid No. 1, E.K. 28, and H. 109, whilst Q. 813, Q. 970, and Q. 903, 7 R. 428, and NG. 103 were wanted in smaller quantities. A very big demand for Tableland Badila is also being supplied from the station, the growers in this locality favouring this variety.

Giru (Haughton Valley).—A day was spent in this prosperous little centre, and it was quite noticeable how much it had gone ahead since my last visit. Unfortunately, having no irrigation system, it has suffered severely from the recent dry spell, the rainfall to date being as follows:—

January	6.99
February	17.19
March	2.75
April .. ..	.35
May .. ..	.23
June .. ..	.66
July	2.02

30.19

Grubs are also much more numerous and more scattered than last year.

The growers who have used arsenic are still of the opinion that its use is beneficial. The most consistent advocate of its use is Mr. R. Wight. It will be remembered that in cane planted in 1920 he used poison at the rate of 40 lb. to the acre. Subsequently he cut a 38-ton crop off this block, although his other cane was badly grub-affected. He is now planting, and after covering the plant with a little soil, adds a dressing at the rate of 65 lb. of arsenic to the acre and then fills in the remainder of the soil. As all the farms here are unirrigated the grubs soon make their presence known in a dry season like the present. In the opinion of competent authorities, it would be advisable to form a pest fund for collecting beetles and grubs in any of the places that are suffering from such a pest, as although undoubtedly expensive, it certainly keeps the damage down. Several tractors were noticed at work in this area. The mill is said to be doing very good work, and although the density has been low, just now it is improving. A good area of young plant cane was observed, but, generally speaking, it was striking very slowly.

CANE PEST COMBAT AND CONTROL.

The following report (dated 15th August, 1922) has been received by the Director of Sugar Experiment Stations from the Entomologist (Mr. E. Jarvis) at Meringa, near Cairns:—

VISIT TO SOUTH JOHNSTONE.

A trip was made to this district on the 17th instant, with the objects of (1) investigating certain diseases of cane reported as occurring in the vicinity of the Johnstone River; (2) studying the insect pests of cane; and (3) fixing on suitable spots for liberation in the near future of tachinid fly parasites to combat the weevil-borer *Rhabdocnemis obscurus* Boisd., which on some plantations is doing a lot of damage.

On the whole the cane at South Johnstone was found to be particularly free from fungus or bacterial diseases, which have at times during prolonged wet weather occasioned serious losses in the Burdekin and other sugar centres.

Badila appear to be the variety mostly grown here, and certainly thrives luxuriously on the best classes of red soil.

The cane inspector (Mr. McCartney) drew my attention, for instance, to a block of plant Badila on which many stools carried from fifteen to nineteen sticks, 6 to 8 feet in length, and from 1½ to 2 inches thick. I desire to thank Mr. James Cran, Mr. P. H. McWalters, and Mr. A. C. Brackenburg for assistance rendered during my visit.

The following cane affections were noticed; all of them being of minor economic importance:—

(1) *Form of Dead Heart*.—About 5 per cent. of the cane on a small block of Badila planted last August was affected by a curious disease characterised by death or non-development of the central shoot, followed by an abnormal growth of the top buds, which varied from 6 to 12 inches in length. The inner surface of the upper leaf-sheaths was intensely red, although the leaves, for the most part, were of normal appearance. In some cases the central core yielded to a slight pull, when the basal portion was seen to be decayed and malodorous. Longitudinal sections of canes showed central discolouration of the terminal portion, but no gumming of any kind, and the rotting base of the dead heart, which was often situated 2 inches or more above the top core of the stick, presented the appearance of having in the first instance been broken transversely as a result of mechanical injury of some kind. A hollow space of an inch or more sometimes occurred behind this decayed end, while the lower portion of the dead heart, although not in any way decomposed, showed irregular patches and lines of red when sectioned lengthwise. It was noticed that one of the internodes, about 9 inches from the top of canes having this disease, was shorter than those immediately above and below it—an indication, perhaps, that growth had been checked at that particular point. A transverse section through this short internode revealed the presence of a decayed, brownish-yellow, core-like spot, or small cavity, about 4 mm. in diameter, with paler suffused margins, situated near the centre of the stalk, and extending about 1 inch in a longitudinal direction. In some cases the surrounding vascular bundles were also discoloured, appearing as watery yellowish-brown spots in cross-section. Possibly the central shoot may have been affected at this stage of growth, and resulted in a gradual development of dead heart later on. No indications of the occurrence either of moth-borers or leaf-eating insects were noticed. Examination of some of the diseased tissue taken from the decayed core occurring in the short internode showed that bacteria were absent.

(2) *Cane Rust* (*Uredo Kuhnii*) occurred in places, but very sparingly.

(3) *Eye Spot Disease* (*Cerospora sacchari*) associated with plants having dead hearts, but was not an invariable accompaniment of this affection, and occurred mostly on the older leaves.

(4) *Red Rot* (*Colletotrichum falcatum*).—Canes exhibiting this well-known disease were observable on some of the trucks. Fortunately injuries due to this fungus can be reduced to a minimum if care be taken to reject when planting any sets showing red discolouration at the cut ends.

(5) *Bunchy-top*.—A few isolated examples of this curious abnormal development of the upper leaves were observed among stools of Badila cane.

CANE BORER AT SOUTH JOHNSTONE.

The weevil-borer *Rhabdoenemis obscurus* Boisd. is causing much damage on some of the cane lands at South Johnstone, and during my visit to the district suitable spots for liberation in the near future of the tachinid fly parasite *Ceromasia sphenophori* were selected. It is hoped that the activities of this parasite may ultimately relieve the situation, although it is, of course, within the bounds of possibility that natural enemies or climatic influences may prove serious obstacles to its successful establishment. Long-continued damp conditions induced by the heavy rainfall might, for instance, enable the entomogenous fungus (*Empusa* sp.) to flourish through the wetter months of the year, in which case it would be likely to operate as a severe check on the increase of these useful parasites. The various species of 'jumping spiders,' and the ever-present black ant *Pheidole megacephala*, found commonly in our cane fields, will doubtless destroy a certain percentage of the flies, but losses from attacks of insect enemies are usually of minor importance compared to those brought about by vegetable parasites. However, we naturally hope for the best, and it may easily happen that the tachinid flies, after liberation, will spread rapidly and do good control work.

BACTERIAL DISEASES OF GRUBS.

On 12th June three grubs exhibiting a pinkish discoloration were collected from cane furrows at Meringa and kept under observation. Eleven days later one of these had developed a bacterial disease (B2), the internal organs of the grub having for the most part disappeared and been replaced by a blackish fluid. When held against a strong light the abdominal regions of the body were seen to be partially hollow, and the skin slightly distended by the action of internal gasses. Smears taken from this grub swarmed with motile rod-shaped bacteria, occurring generally in pairs, but often in chains of from three to five. Attempts to infect healthy grubs with this bacillus have not, so far, proved successful.

Grubs attacked by another form of bacterial disease (B3) (*coccobacillus* sp. (?)) the symptoms of which resembled those produced by *Coccobacillus nigrofasciens*, were obtained this month, smears taken and cultures made, slices of potato being used as a medium. Healthy grubs inoculated with this disease developed all the characteristic external signs of blackening around the spiracles after twenty-four hours, and succumbed within three to five days. The rod-shaped organism responsible for this disease differs from that of the preceding (B2) in being proportionately longer and occurring almost invariably in pairs. Grubs affected by it emit an exceedingly offensive odour.

A third cane-grub, displaying dull red patches on the sides of the body, and which had apparently died of some bacterial malady, was found upon examination to harbour multitudes of the *Coccobacillus* No. (B3), and another species, *Micrococcus* sp. (?) (B7). Colonies formed by the latter on slices of potato were of a decided red colour, while those derived from (B3) were creamy-yellow. Healthy grubs inoculated with the red bacillus (B7) remained normal, but Mr. Cottrell-Dormer, Assistant Entomologist, discovered that when they were inoculated with the two bacilli, mixed together in water, the virulence and activity of the *Coccobacillus* (B3) was greatly increased, and that grubs so treated died in about twenty-four hours.

We hope to find some simple and practical method of infecting cane-grubs with some suitable bacterial disease. This interesting phase of grub control has hitherto received little or no attention in Queensland, but nevertheless presents possibilities which should not be overlooked.

SOIL FUMIGANT FOR GRUBS.

Laboratory and preliminary field experiments with a certain soil fumigant gave very encouraging results, and a special report was published on same.

AN EFFICIENT SOIL-FUMIGANT FOR CANE GRUBS.

The following special report (dated 11th August, 1922) has been received from the Entomologist at Meringa (Mr. Edmund Jarvis) by the Director of the Bureau of Sugar Experiment Stations:—

In recent reports mention has been made from time to time of experimentation in connection with fumigants suitable for injection in a dry form, the ideal aimed at being discovery, if possible, of some substance that can be easily applied during the course of cultural operations, which is harmless to handle, and which possesses deterrent or killing properties of an enduring nature.

Many promising substances have been investigated here during the past six months, comprising various pungent oils and certain deadly poisons. The latter were combined in some cases with suitable chemical compounds in order that they might be handled with safety during field operations.

Several of these preparations yielded excellent results against caged grubs in our insectary, but when tested in the open did not altogether realise expectations. Nevertheless, some of them are considered good enough to warrant further study, and we hope to ultimately devise satisfactory methods of applying these deterrents in the field.

You will, however, be interested to learn that recent experiments here with a fumigant—the properties of which were first investigated by the writer seven years ago, whilst at Gordonvale (see "Queensland Agricultural Journal," June, 1915, p. 262) have given the best results so far obtained, both in laboratory and field work.

This substance, which is one of the halogen derivatives, known commercially as dichlorobenzole (para-dichlorobenzene), is said to be obtained by passing chlorine into benzene containing iodine or molybdenum pentachloride until a sample of the resultant fluid will partly crystallise on cooling.

The ultimate chemical derived, after washing and distillation, takes the form of irregular semi-transparent crystalline nodules of somewhat oily appearance, possessing a penetrating but not unpleasant odour very like that of ordinary benzene.

INITIAL EXPERIMENTATION.

As a preliminary test at Gordonvale laboratory in 1915, six grubs were confined in a cage holding 54 cubic inches of sifted soil, with which had been mixed 15 grains of the deterrent (1 oz. to 1 cubic foot). After two and a-half days all larvæ were dead and partially rotten. This experiment was repeated on three subsequent occasions, with similar results. Eighteen large grubs were then placed in an open cage containing 1 cubic foot of unsifted soil, infected with $\frac{1}{2}$ oz. of coarsely crushed dichlorbenzole; and thirty-six hours later three had succumbed and the remainder were lying motionless as though paralysed, all dying in less than a fortnight. Tests were then applied to determine the effect on larvæ of isolated injections of the chemical in crushed form administered at various depths, and these trials proving satisfactory, it was decided to experiment in the open. A plot of ground was accordingly prepared on 3rd April, 1915, by being dug 9 inches deep, allowed to settle for a few days, and treated with a single line of $\frac{1}{2}$ oz. injections placed 1 foot apart, and 5 inches below the surface. Grubs of the grey-back cane-beetle were then buried in the soil at various distances from the chemical, each larva being confined in a specially designed cage, that whilst preventing extended movement in a horizontal direction allowed it to descend vertically to a depth of 9 inches or to ascend to within 1 inch of the surface, and at the same time ensured continuous natural conditions with respect to drainage, moisture, temperature, &c. Examined on the 12th instant (nine days later), the soil was found more or less impregnated with the odour of the deterrent to a distance of 1 foot on each side of injections. Larvæ placed at distances of 6 to 8 inches were dead and partially decomposed, those at 9 inches, dying, but able to move convulsively, and those 1 foot away alive and apparently normal. Grubs situated 9 inches from the chemical succumbed on the 18th instant (after fifteen days), whilst those 1 foot distant, and control specimens, continued unaffected throughout the experiment.

This test was repeated later, with practically identical results, and further trials, in which the injections were reduced to 80 grains, placed 1 foot 6 inches apart, also proved satisfactory.

Experiments conducted at Meringa last April in a field of first ratoons of D. 1135 proved just as successful as those carried out by the writer in 1915. Four stools were treated with doses varying from 2 to 8 scruples, placed 5 inches below the surface, and 2 to 5 inches from the cane sticks. When examined a week later all grubs within about 8 inches of the chemical were dead, while the odour had strongly impregnated the soil to a distance of about 9 inches on all sides of the 4 to 6 scruple injections. During the preceding fortnight the weather had been dry, but two days before making the experiment 0.06 inches of rain fell, and during the course of the experiment 0.12 inches. The soil was fairly damp throughout the week.

RATE OF EVAPORATION.

With reference to the rate of evaporation of dichlorbenzole, I observed that in dry weather, a quarter of an ounce (left fifteen days underground at a depth of 7 inches during an average temperature of 69 degrees Fahr.) lost nearly half its weight, but did not actually disappear until the end of six weeks. Under wet conditions both evaporation and soil infection were retarded.

Investigations being conducted at the present time in very damp closely packed soil, in a field of first ratoons, have shown that injections of 4 drachms lost half a drachm during a period of eighteen days, from which we may gather that under such conditions evaporation would continue during a space of about four months.

It is worth noting, however, that the deterrent odour remains in the ground long after all traces of its origin have vanished.

Soil under cane stools treated 5th March, 1915, was found strongly infected on 8th May, three weeks after complete evaporation, from which we may reasonably assume that a limited area of such contaminated soil—comprising, say, a strip at least a foot wide—would continue repellent until the odour became less decided.

METHODS OF APPLICATION.

Dichlorbenzole would prove an ideal fumigant for plant cane, as it could simply be put in the furrows with sets when planting, and if applied during November or December the odour would have ample time to penetrate and render the soil on each side of stools distasteful to the beetles and deter them from ovipositing in ground thus contaminated.

In the event of eggs being deposited near the plants, this fumigant would certainly kill any grubs that might hatch from them.

In seasons when it is possible to plant very early, a crop could be assured by using dichlorbenzole, even though the cane were planted on an area infested by grubs, at a time of year when they were doing their worst damage. The fumigant, however, would prevent them from touching the sets, and not only kill all that happened to occur in the immediate vicinity, but also protect the soil from further invasion until grubs had ceased feeding and all danger was over.

For application to ratoon crops the chemical could either be injected in the form of balls of the desired weight, or these be dropped at suitable intervals in a furrow made close against the line of stools to be treated. The best time for such application would be during December or January, before the cane got too high, the result being that all first and second stage grubs arising from eggs deposited in November and December would be killed before they were able to work appreciable damage.

COST OF APPLICATION.

During 1915 the price of dichlorbenzole was stated to be about 6d. per lb., but owing to its being manufactured only in Germany it was not easily procurable during the late war.

On the 16th of last June, however, I wrote to Berlin, inquiring the present price in bulk quantity, &c., and ordering enough of the chemical to enable us to carry out a field demonstration during the coming grub season.

Assuming the price to be 6d. per lb., it would cost less than £2 to treat one acre of cane with $\frac{1}{2}$ -oz. injections, but this is a matter which will need to be determined later.

Unlike arsenical and other poisonous preparations, dichlorbenzole possesses the great advantage of being harmless and clean to handle, while the odour arising from it is not in any way objectionable.

In no instance has experimentation with this fumigant been followed by noticeable injury to the growing cane plants. Sets of Badila planted immediately over injections made in open ground at the laboratory have rooted in the contaminated soil, and at the present time the growth above ground appears quite normal.

Apropos of the foregoing, the Agricultural Chemist (Mr. J. C. Brünnich) comments as follows:—

About 30 years ago I had good results in the Mackay district by fumigation of the cane stools in the field with bisulphate of carbon for the destruction of cane grubs. I at once saw the possibilities of using this new chemical for the same purpose, as it has great advantages over the former. Bisulphide of carbon (commercial) has a very disagreeable smell, is highly inflammable, evaporates very rapidly, and its vapours form explosive mixtures with air. Dichlorobenzene (para) has a not-unpleasant aromatic odour, is absolutely non-inflammable, evaporates very slowly, and is also practically non-poisonous to man.

I wrote to the "Agfa" company, mentioning the probable extensive use of the chemical for the killing of cane grubs, and, although, according to a notice printed on the labels, the export of this chemical to foreign countries was not permitted, they sent me two 7-lb. tins, free of charge, for experimenting, which were landed here just about the time war broke out. One of these tins I handed to Mr. Easterby, the Superintendent of Sugar Experiment Stations, and Mr. Jarvis, under his direction, made the first experiments, reported in June, 1915.

The present price of the pure chemical is 3s. per lb., but I have no doubt that a cruder product would be quite as efficient, and should be produced at greatly reduced cost. This chemical is invaluable for the destruction of moths, silverfish, and weevils in grain in confined spaces, and for the latter purpose it has the advantage over bisulphide of carbon, which hitherto was the only efficient remedy against grain weevils, that it does not appear to injure the germinating power of the seeds so treated. Experiments to prove this fact have been in progress for some considerable time at the seed laboratory. The odour of the chemical is very persistent, and if grain fumigated with it is fed to fowls, the eggs have a distinct flavour of the chemical.

OIL FROM SHALE.

In various parts of the world, including Australia, there are deposits of shale from which it is possible to distil oil on a commercial basis. An improvement on the usual process has just been introduced by a British engineer. The shale is powdered and heated until it is just about to give off vapour. It is then mixed in a retort with hot sand, which thus raises it to the temperature required for complete carbonisation, but does not raise it beyond the point at which all the volatile constituents will be distilled off. Tests made of this process show that no clinking of the material takes place.

A SUMMARY OF SOME EXPERIMENTS CARRIED OUT BY THE BUREAU OF SUGAR EXPERIMENT STATIONS.—IV.

By H. T. EASTERBY, Director.

The first article of this series, in the course of which Mr. Easterby discussed deep cultivation experiments and tabulated comparative crop results from subsoiled and non-subsoiled fields, was published in the May journal. The second instalment was an account of the results of irrigation experiments and the action of irrigation and manures upon the density and purity of sugar juices, and appeared in the June issue. The third instalment, treating of experiments in fertilisation, appeared in the August journal.—Ed.

In 1905 experiments for determining the most suitable distances between the plants in the row and the widths of the cane rows were laid down. These comprised ten separate plots, and were as under:—

Date of Planting.			Variety Used.			Width between the Rows.	Width between the Plants in the Row. (Three eyes to each plant.)
April, 1905	..	..	N.G. 40	..	..	5 feet	Continuous cane
April, 1905	..	..	ditto	..	..	5 feet	6 inches
April, 1905	..	..	ditto	..	..	5 feet	12 inches
April, 1905	..	..	ditto	..	..	5 feet	18 inches
April, 1905	..	..	ditto	..	..	5 feet	24 inches
April, 1905	..	..	ditto	..	..	5 feet	36 inches
April, 1905	..	..	N.G. 24A	..	..	4 feet	6 inches
April, 1905	..	..	ditto	..	..	5 feet	6 inches
April, 1905	..	..	ditto	..	..	6 feet	6 inches
April, 1905	..	..	ditto	..	..	7 feet	6 inches

Before furnishing the analytical data and crop results from these experiments, two tables are given which set forth the number of plants per acre, the number of eyes per acre, and the weight of seed per acre, in the two series of tests now under discussion. The first series deals with the number of plants in the row, the distance between the rows in this series being uniformly 5 feet; and under the heading of "Weight of seed used per acre" it is seen that, while one continuous stick in the row used $2\frac{1}{2}$ tons of seed per acre, the other extreme of 36 inches between the plants in the row used only half a ton of seed per acre. In the second series it is also shown, that a distance between the rows of 4 feet used 1 ton 18 cwt. of seed per acre, while the distance of 7 feet between the rows used 1 ton 2 cwt. per acre. These data require to be kept in mind when the crop results are dealt with in a later place.

DISTANCE EXPERIMENTS.

CANE PLANTS USED PER ACRE.

FIRST SERIES.

Distance between the Plants.	Number of Plants per Acre.	Number of Eyes per Acre.	Weight of Seed used per Acre.
			Tons cwt.
1. Continuous stick in the row .. Continuous stick ..	34,848	2	10
2. Plants 6 inches apart	6,969	20,907	1 10
3. Plants 12 inches apart	4,976	14,927	1 2
4. Plants 18 inches apart	3,867	11,601	0 16
5. Plants 24 inches apart	3,168	9,504	0 14
6. Plants 36 inches apart	2,323	6,969	0 10

SECOND SERIES.

Distance between the Rows.	No. of Plants per Acre.	No. of Eyes per Acre.	Weight of Seed used per Acre.
			Tons cwt.
1. 4 feet apart	8,712	26,136	1 18
2. 5 feet apart	6,969	20,907	1 10
3. 6 feet apart	5,808	17,424	1 4
4. 7 feet apart	4,978	14,934	1 2

The plant crop of the above experiment was harvested in September, 1906. The analytical data is given below:—

ANALYSES OF PLANT CANE IN THE DISTANCE EXPERIMENTS, SEPTEMBER, 1906.

FIRST SERIES.

Variety of Cane.	Distance between the Plots.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.).	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Fibre in Cane.	Sucrose in Cane.
N. Guinea 40 ..	Continuous stick in the row	27-9-06	17 mths.	16.6	15.03	.67	90.5	10.16	13.50
N. Guinea 40 ..	Plants 6 inches apart	27-9-06	ditto ..	16.5	14.74	.68	89.3	11.29	13.07
N. Guinea 40 ..	Plants 12 inches apart	27-9-06	ditto ..	17.0	15.62	.62	91.8	10.59	13.96
N. Guinea 40 ..	Plants 18 inches apart	27-9-06	ditto ..	18.2	16.97	.46	93.2	10.57	15.17
N. Guinea 40 ..	Plants 24 inches apart	27-9-06	ditto ..	17.0	15.16	.78	89.1	9.86	13.66
N. Guinea 40 ..	Plants 36 inches apart	27-9-06	ditto ..	19.0	17.59	.47	92.5	10.74	15.70

SECOND SERIES.

Variety of Cane.	Distance between the Rows.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.).	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Fibre in Cane.	Sucrose in Cane.
N. Guinea 24A	4 feet	27-9-06	17 mths.	18.7	16.88	.57	90.2	10.41	15.12
N. Guinea 24A	5 feet	27-9-06	ditto ..	19.5	18.30	.36	93.8	10.25	16.42
N. Guinea 24A	6 feet	27-9-06	ditto ..	19.3	18.00	.37	93.2	10.30	16.14
N. Guinea 24A	7 feet	27-9-06	ditto ..	19.6	18.27	.41	93.2	10.04	16.43

Before discussing the actual crop results, attention is called to the analytical data furnished in the analyses of the two series. In the analyses of the first series it is noted that there is an increased density, on the whole, in the canes that were planted the greater distance apart in the rows. For example, the density of the juice from the "continuous stick" plot was 16.6 Brix., while the density from the plot where the plants were 36 inches apart in the row was 19.0 Brix. The density, however, is not strictly progressive with the distance apart between the plants in the row. Special reference is made to the following matter:—The cane in these experiments was seventeen months old when cut; this is known as a "long crop." This age of the crop allowed time for all the younger canes resulting from the suckers to reach maturity, and this enabled a higher density and purity to be obtained. This was facilitated by the greater distance between the stools or plants in the row, permitting the sunlight, which is the chief maturing agent, to effect its work. Thick standing crops, particularly if they are heavy enough to go down and lie upon the ground, thus excluding to a greater extent the air and the sun, are very generally lower in density and purity of the juice. Soils, however, have also some influence in this respect.

The analytical data in the second series tend to confirm the observations that have been made relating to the first series. It is noted that the density and purity of the juice from the cane planted in rows 4 feet apart are the lowest, while the density and purity from the rows planted 7 feet apart are the highest, although the difference in quality between the different plantings is not very high.

The crop results from the two series were as follows:—

CROP RESULTS OF THE DISTANCE EXPERIMENTS, PLANT CANE, 1906.

FIRST SERIES.

Distance between the Plants in the Row.	Name of Variety.	Age of Cane.	Number of Canes per Acre.	Average Weight of the Sticks in lbs.	Weight of Cane per Acre in English tons.	Yield of Sugar per Acre in English tons.
1. Continuous stick in the row	N.G. 40..	17 mths.	28,749	4.3	56.4	7.6
2. Plants 6 inches apart	N.G. 40..	ditto ..	32,016	3.8	55.7	7.2
3. Plants 12 inches apart	N.G. 40..	ditto ..	30,927	3.7	51.4	7.1
4. Plants 18 inches apart	N.G. 40..	ditto ..	33,105	3.3	49.5	7.5
5. Plants 24 inches apart	N.G. 40..	ditto ..	32,670	3.4	50.2	6.8
6. Plants 36 inches apart	N.G. 40..	ditto ..	33,541	3.0	44.9	7.0

SECOND SERIES.

Distance between the Rows.	Name of Variety.	Age of Cane.	Number of Canes per Acre.	Average Weight of the Sticks in lbs.	Weight of Cane per Acre in English tons.	Yield of Sugar per Acre in English tons.
1. 4 feet apart ..	N.G. 24A	17 mths.	24,502	6.8	75.3	11.3
2. 5 feet apart ..	N.G. 24A	ditto ..	24,393	5.8	63.5	10.4
3. 6 feet apart ..	N.G. 24A	ditto ..	25,591	5.1	58.8	9.4
4. 7 feet apart ..	N.G. 24A	ditto ..	24,734	4.9	55.1	9.0

In discussing the actual crop results of these experiments, very noteworthy observations have to be made.

In the first series it is shown that one continuous stick planted in the row, also the plants only 6 inches apart in the row, gave over 11 tons of cane per acre more than where the plants were placed 36 inches apart in the row. Yet, when reference

is carried back to the table showing the amount of seed used per acre in planting, these results show that for the extra 2 tons of cane used per acre in planting an additional 11 tons of cane per acre were obtained as the crop result.

In the crop results of the second series, the first startling result is that the cane from the rows planted 4 feet apart gave 20 tons per acre more cane than was obtained from the rows 7 feet apart, and it is noted that the gradation is regular and progressive along the line of the different widths between the rows which the experiments represented. It is not only in the weight of cane per acre but also in the yield of sugar per acre that it is shown that the thicker planting has given such notably bigger results; the cane from the rows 4 feet apart yielded $11\frac{1}{2}$ tons of sugar per acre, while the cane from the rows 7 feet apart yielded 9 tons of sugar per acre, or $2\frac{1}{2}$ tons per acre less.

The differences in the results between the first series and the second series are very noteworthy. The data set forth indicate that the variation in difference between the rows has a much more definite bearing upon the crop results than the variation in distance between the plants in the row.

The different nature of soils and differences in climatic conditions can also have an influence upon the settlement of this question. For example, in the Northern districts, with heavy rainfalls and moist conditions, the small distance between the rows may not be so advisable. Again, in the south, where droughts can be long and furious, a small distance between the rows can quickly exhaust the moisture content of the soil, so that the crop cannot reach anything like maturity; while, if the rows were 6 feet apart, the moisture content may be enough to bring a lower weight of cane to a condition fit for cutting. As an illustration of this it may be stated, in connection with the maize crop, that when a drought has been imminent and actually coming on, farmers have been advised to cut out every other row so that the remaining row could get the advantage of the total moisture in the soil, and this has resulted in bringing a half-crop to maturity; whereas had the whole crop remained upon the ground not an ear of corn would have been formed on any of it. These facts show how many and how intricate are the conditions and factors which relate to the question of planting. In the Mackay district specially, where these experiments were carried out and where the soil conditions and rainfall are relatively uniform and favourable to the cane crop, there is no doubt that a very reliable guidance will be found in the results of the experiments.

In leaving the discussion of the planting experiments, as set forth in the tables of the first and second series, it must be explained that two varieties of cane were used. In the first series, New Guinea No. 40 was used in the tests; in the second series, variety New Guinea No. 24A was used. The latter variety is very superior, both as a cropper and as a sugar yielder, to the New Guinea No. 40, and the behaviour of the two varieties in these distance experiments corresponds almost exactly to their behaviour in all other experiments in which they have been used.

It is not proposed to give the results of the first, second, and third ratoon crops separately, but to total them with the plant crops. The results of the ratoon crops followed very closely those of the plant crop.

The total results of these experiments now follow:—

**TOTAL RESULTS OF THE DISTANCE EXPERIMENTS: COVERING PLANT,
FIRST, SECOND, AND THIRD RATOON CROPS, 1906-1909.**

FIRST SERIES.

Distance between the Plants in the Row.	Name of Variety.	Total Cane per Acre, English Tons (4 crops).	Total Sugar per Acre in Pounds (4 crops).	Total Sugar per Acre, English tons (4 crops).
1. Continuous stick in the row	N.G. 40 ..	201.6	63,113	28.1
2. Plants 6 inches apart ..	N.G. 40 ..	198.8	62,214	27.7
3. Plants 12 inches apart ..	N.G. 40 ..	186.2	58,328	26.0
4. Plants 18 inches apart ..	N.G. 40 ..	166.0	56,619	25.2
5. Plants 24 inches apart ..	N.G. 40 ..	177.7	57,157	25.5
6. Plants 36 inches apart ..	N.G. 40 ..	152.1	51,285	22.8

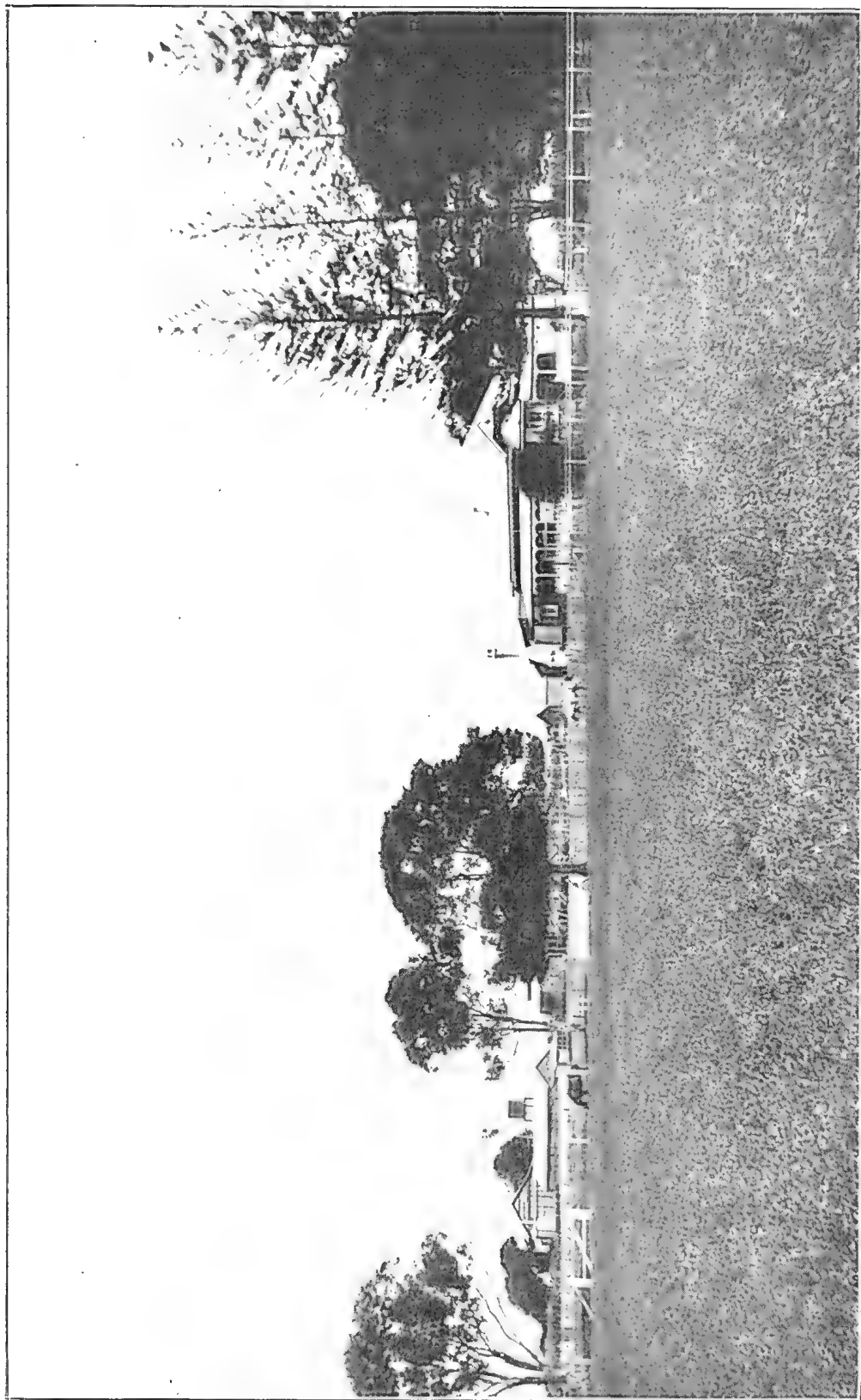


PLATE 16.—SUGAR EXPERIMENT STATION, BUNDABERG.

Photo : Dept. Agriculture and Stock.]

SECOND SERIES.

Distance between the Rows.	Name of Variety.	Total Cane per Acre, English tons (4 crops).	Total Sugar per Acre in Pounds (4 crops).	Total Sugar per Acre, English tons (4 cr. ps).
1. 4 feet apart	N.G. 24A ..	246.2	86,392	38.5
2. 5 feet apart	N.G. 26A ..	208.4	75,514	33.6
3. 6 feet apart	N.G. 24A ..	190.8	65,447	29.1
4. 7 feet apart	N.G. 24A ..	181.0	64,452	28.7

SUMMARY.

From this table final and definite conclusions must be made, and the advantage to be derived from wide and narrow planting, and using more or less seed per acre, will be found. Commencing by taking the first series, we find that the total cane and sugar per acre produced by the four crops shows us that the plot in which the sets were placed continuously in rows 5 feet apart has produced—

First.—An increase above the yield from plants placed 6 inches apart in the row amounting to 2 8/10 tons of cane and 8 cwt. of sugar per acre, for an expenditure of 20 cwt. more seed per acre;

Second.—An increase above the yield from plants placed 12 inches apart in the row amounting to 15 4/10 tons of cane and 2 1/10 tons of sugar per acre, for an expenditure of 28 cwt. more seed per acre;

Third.—An increase above the yield from plants placed 18 inches apart in the row amounting to 35 6/10 tons of cane and 2 9/10 tons of sugar per acre, for an expenditure of 34 cwt. more seed per acre;

Fourth.—An increase above the yield from plants placed 24 inches apart in the row amounting to 23 9/10 tons of cane and 2 6/10 tons of sugar per acre, for an expenditure of 36 cwt. more seed per acre; and

Fifth.—An increase above the yield from plants placed 36 inches apart in the row amounting to 49½ tons of cane and 5 3/10 tons of sugar per acre, for an expenditure of 40 cwt. more seed per acre.

Note.—All rows in above series were 5 feet apart.

This series was somewhat upset by the irregular behaviour of Plot No. 4, where the plants were placed 18 inches apart. This was thought to be due to the depredations of pests. In other respects the results are very conclusive.

When we consider the results from the second series, it must be remembered that a superior variety of cane was here used. This series has from the beginning given more uniform and striking results. The total crop yields from the plant and three ratoons may be summarised as follows:—

The cane planted in rows 4 feet apart has produced:—

First.—An increase above the yield from the cane planted in rows 5 feet apart amounting to 37 8/10 tons of cane and 4 9/10 tons of sugar per acre, for an expenditure of 8 cwt. more seed per acre;

Second.—An increase above the yield from cane planted in rows 6 feet apart amounting to 55 4/10 tons of cane and 9 4/10 tons of sugar per acre, for an expenditure of 14 cwt. more seed per acre; and

Third.—An increase above the yield from cane planted in rows 7 feet apart amounting to 65 2/10 tons of cane and 9 8/10 tons of sugar per acre, for an expenditure of 16 cwt. more seed per acre.

It is therefore evident, on comparing the two series, that the variation in distance between the rows has a far more important bearing on the yield than the variation of the plants in the rows, while at the same time the expenditure of seed is not nearly so large.

The conclusions which may be safely drawn from these experiments at Mackay are, therefore:—

First.—Plants with three eyes, placed 6 inches apart in the row, or even closer, is found to be the best method of planting the sets in the row.

Second.—Any increase in distance between the rows exceeding 5 feet is likely to result in a low weight of cane and yield of sugar per acre, while 4 feet between the rows has been found to result in a considerable increase both of cane and sugar.

It must, however, be carefully borne in mind that these experiments must be considered as applicable only to the Mackay district in normal years. In the North, with its heavy rainfalls and moist, humid conditions, thick planting may not be at all advisable, while south of Mackay, where droughts are not uncommon, a wider distance, providing more moisture for the cane, may be imperative.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JULY 1922, AND 1921, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	July.	No. of Years' Records.	July, 1922.	July, 1921.		July.	No. of Years' Records.	July, 1922.	July, 1921.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
	In.		In.	In.		In.		In.	In.
Atherton ...	0.90	21	2.24	1.24	Nambour ...	2.72	26	3.45	6.66
Cairns ...	1.61	40	2.50	1.64	Nanango ...	1.77	40	2.53	3.52
Cardwell ...	1.45	50	2.05	2.49	Rockhampton ...	1.50	35	3.20	5.81
Cooktown ...	1.00	46	0.55	1.19	Woodford ...	2.52	35	2.66	5.37
Herberton ...	0.69	35	2.21	2.40					
Ingham ...	1.64	30	2.20	3.64	<i>Darling Downs.</i>				
Innisfail ...	4.77	41	3.55	7.33	Dalby ...	1.82	52	1.81	3.30
Mossman ...	1.54	14	2.34	1.28	Emu Vale ...	1.60	26	2.50	5.77
Townsville ...	0.58	51	1.48	3.45	Jimbour ...	1.71	34	1.67	2.04
					Miles ...	1.80	37	0.95	2.25
<i>Central Coast.</i>					Stanthorpe ...	2.06	49	3.30	8.07
Ayr ...	0.68	35	2.10	5.68	Toowoomba ...	2.06	50	3.55	5.33
Bowen ...	0.95	51	2.40	2.77	Warwick ...	1.83	57	3.08	6.32
Charters Towers ...	0.59	40	3.99	2.85					
Mackay ...	1.70	51	4.66	7.19	<i>Maranoa.</i>				
Proserpine ...	1.41	19	2.50	8.08	Roma ...	1.53	48	0.72	6.88
St. Lawrence ...	1.26	51	3.83	4.45					
<i>South Coast.</i>					<i>State Farms, &c.</i>				
Biggenden ...	1.31	23	2.58	2.62	Bungewongorai ...	1.88	8	0.54	7.05
Bandaberg ...	1.92	39	3.33	2.88	Gatton College ...	1.44	23	2.12	4.12
Brisbane ...	2.31	71	4.68	6.14	Gindie ...	1.14	23	0.73	2.85
Childers ...	1.67	27	2.59	3.93	Hermitage ...	1.80	16	2.96	6.37
Crohamhurst ...	2.94	30	3.26	7.85	Kairi ...	1.19	8	2.73	1.73
Esk ...	2.00	35	2.89	4.24	Sugar Experiment Station, Mackay	1.51	25	4.37	6.97
Gayndah ...	1.49	51	3.16	2.78	Warren ...	1.27	8	2.50	5.42
Gympie ...	2.17	52	2.64	5.40					
Glasshouse M'tains	2.41	14	...	6.62					
Kilkivan ...	1.70	43	2.21	2.22					
Maryborough ...	1.95	51	2.47	3.46					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for July this year, and for the same period of 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE E. BOND,
State Meteorologist.

THE HUMAN MACHINE ON THE LAND.

Following are extracts, continued from the August Journal, from an interesting contribution to "The Journal of the Ministry of Agriculture" (U.K.), by W. J. Malden. Presenting a new view of "farm labour as farm athletics" they will be appreciated.

TRAINING IN FARM LABOUR IS EASY.

However, training in farm labour is a very simple thing, and is capable of being taught easily and systematically. That amongst older men, there would be opposition to this there is no doubt, and many who have tried to inculcate fresh methods have met a resistance which has caused them to discontinue their efforts, as they have found that sometimes it is better to carry out a bad method well than a good method badly.

In systematising work I have followed closely the practices in the more strenuous sports. No matter what the physical work or sport, no one commences to do it in the right way, whether it is handling a golf club or a scythe, and unless the proper way is shown little skill is obtained. It has to be remembered that a man is a machine—the most wonderful machine in the world—capable of doing any work performed by the most intricate machinery. He is superior to farm animals because they are horizontal machines capable of doing work only in a straight line forward or backward. Man is a hinged vertical machine not only doing this, but able to stoop and lift heavy weights vertically, which a horse cannot do. Also he has lateral action; by a heave from his hips and a shoulder jerk, he can pitch a sack of wheat sideways some feet clear of himself. He also has linked action through the arms by which he gets arm swing in association with body swing, and so can use a scythe or an axe, and throw heavy bodies from side to side by hand grip. Again, when using a tool he can get an up and down action from arms and body, as in pumping or threshing with a flail. He can also pull with the arms, using body weight. He can utilise the back swing over the hips, together with the leg drive, as in rowing, hoeing, or tug-of-war. He can lift upwards as in digging, or pitch sheaves, or swing a long hedging bill. In fact there is practically no action or combined action he cannot perform. His hinges at the ankle, knee, hips, shoulders, wrists, and fingers are under the influence of muscles and tendons, which flex and give rise to powerful actions, which are often assisted by dead weight, and their proper use takes advantage of leverages; moreover, with tools in hand a man finds leverage from these as well as from outside conditions. We do not think of ourselves as machines until we go in for sports; yet a skilled athlete is but an expert artisan in an unproductive calling. A man with skilled training takes little out of himself as compared with one untrained. It is the same in all farm work; brute strength is helpful, but a weaker man who has got the knack can beat the unskilled any and every time, just as an old man who is skilled is worth more on a farm than a young one unskilled.

"Putting one's back into work" means much more than mere exertion: it means using one's force and dead weight to the best advantage. The greater part of all heavy work should be done by the back and legs through leverage and momentum obtained through the joints or hinges, and to a large extent these are obtained merely by skill in actuating them, viz., learning how to apply them to the best advantage. The arms and hands are convenient means through which the power is transmitted to tools, they give 'finish' of work, and add to celerity. Knack is merely a proper co-ordination of mind and muscle brought to the position where effort is not needed to work them together; but one may have a bad knack so it is necessary to learn the correct method of working.

When the best method of working is decided upon, it will be found that it comprises a certain number of actions to complete an operation; and these actions will be repeated in the same sequence in each operation. I have analysed the various operations into individual actions, eliminated the wasteful ones, and taught the others separately. Next they are run together and operation is linked to operation. As these are repeated there must be an easy connection between them making a series of smooth movements each similar, but necessary for continuous work. We see it in mowing, hoeing (when done in the proper manner), digging, axe work, planting cabbages, &c. Finally, the human machine tunes itself up to a speed compatible with endurance through an average working day.

NEED FOR INTELLIGENT OBSERVATION.

However, the human machine should be made to bring its intelligence to bear, to realise its powers, and the mechanical forces within it. The simplest laws of mechanics must be followed. These can be taught very simply and quickly by simple illustration. It may be mentioned that little effective work can be done with the legs straight and rigid. The body and legs must relax, otherwise the rocking and rolling actions obtainable about the hinges or joints at the hips, knee and ankle, so necessary to give effect to body swing, either fore and aft or laterally, cannot be obtained. They give an opportunity to take advantage of good footwork and stance

—two of the first essentials, as they afford the opportunity to make use of momentum, and to regain equilibrium, without which rythmical actions will not be maintained.

Then, again, relaxation is needed to allow the body to go down to the squat or crouch to do any work where stooping is required, and to do it without a backache—as in cabbage planting. The body must always have an easy balance or poise, or it will be overbalanced, so that power is lost and a proper sequence of actions cannot be taken. It is not necessary to go near to a man to see if he is working properly; it is shown as soon as he can be clearly seen. Sufficient proof is afforded by the fact that a man keeps time with himself throughout his work. It may be clearly seen whether a man works inside his work, or uses a tight grip where he should use the running hand, or uses the ham knuckle jerk in lifting a sheaf on to a wagon or rick, or is using his body leverage and not merely an arm lift or swing. Whether he understands the simple laws of levers as applied to the mechanism of his own body, has some knowledge of a suitable line of draught, realises the advantage of using his reach, has a notion of timing an action or values the effect of wrist work and other points, is discernible to anyone who has a proper knowledge of skilled workmanship.

SIMPLE INSTRUCTION.

By simple demonstration all these are easy to teach to the old or young. It is so simple that it can be taught to children of almost any age, and could be taught in any village school playground; moreover, a boy leaving school at fourteen could be trained thus in many necessary forms of work, and be skilled in work, whereas otherwise he would go on to a farm without skill, and often by working where poor skill prevails, even after a lifetime on it would remain inefficient.

That strength is not the ruling influence in effective working I recently demonstrated through a cinematograph film showing girls after three months' training doing very varied work, including most of the heaviest done on the farm. By the proper application of their powers they were able to work without undue fatigue, they got the knack of doing the work in the most effective manner, and they worked with perfect rhythm.

It may be taken as a pretty safe axiom that if dung is loaded and spread by long handled forks, if hoeing is done by dub-headed hoes instead of swan necks, and if hedges are trimmed back with short (one handed) swaps or fagging hooks, then the standard of work generally is a low one, whilst the absence of cabbages in a stock-raising district is pretty good evidence that the men have not learned to stoop without making their backs ache. Yet nothing is easier than transplanting done skilfully. With a proper stoop there is no need for backache. In many districts there is not a man who can plant 2,000 cabbages a day, yet after short training they are able to do it, and find it easy to plant 5,000. Where this is done the crop is cheaper and more reliable than any other form of root-growing.

In view of the large number of persons who have come on to the land wholly unskilled, with little likelihood of training whereby they will become skilled, whether they come as workmen, small holders, men from the services, allotment holders, who are spending energy with small results, one cannot fail to see the low efficiency on the land. Boys come to the land as stop gaps with no knowledge, skill, or incentive to work. They think that a fixed wage now will see them through life, but without skill it will not. Any training or incentive to skill is sorely needed to restore and maintain craftsmanship in agricultural labour. It is necessary if the land is to be kept under cultivation. The significance of this is obvious.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 14.

PENNANTIA CUNNINGHAMII.

This species, which abounds in the scrubs of Eastern Australia from Illawarra, New South Wales, to D'Aguilar Range (Mount Glorious), Queensland, attains a height of about 80 feet and a barrel diameter of 3 feet. The barrel is often irregular or angular in cross-section, crooked, and leaning to one side; so-called sucker (coppice) shoots are often frequent on the barrels. The bark is grey or brown in colour, and often somewhat scaly. When cut it is seen to be reddish-brown in colour and measures $\frac{1}{4}$ inch thick on a tree with a barrel diameter of 3 feet. Mr. Kruger, Wood Technologist of the Forestry Department, informs us that the wood is likely to become valuable, as it promises to be an excellent substitute for English beech; he recommends its use for planes, brush-backs, &c. Hitherto the timber has been regarded as almost useless. We have noticed that the trees are very abundant in certain parts of the scrubs in the ranges eastward of Emu Vale, in the Killarney District.

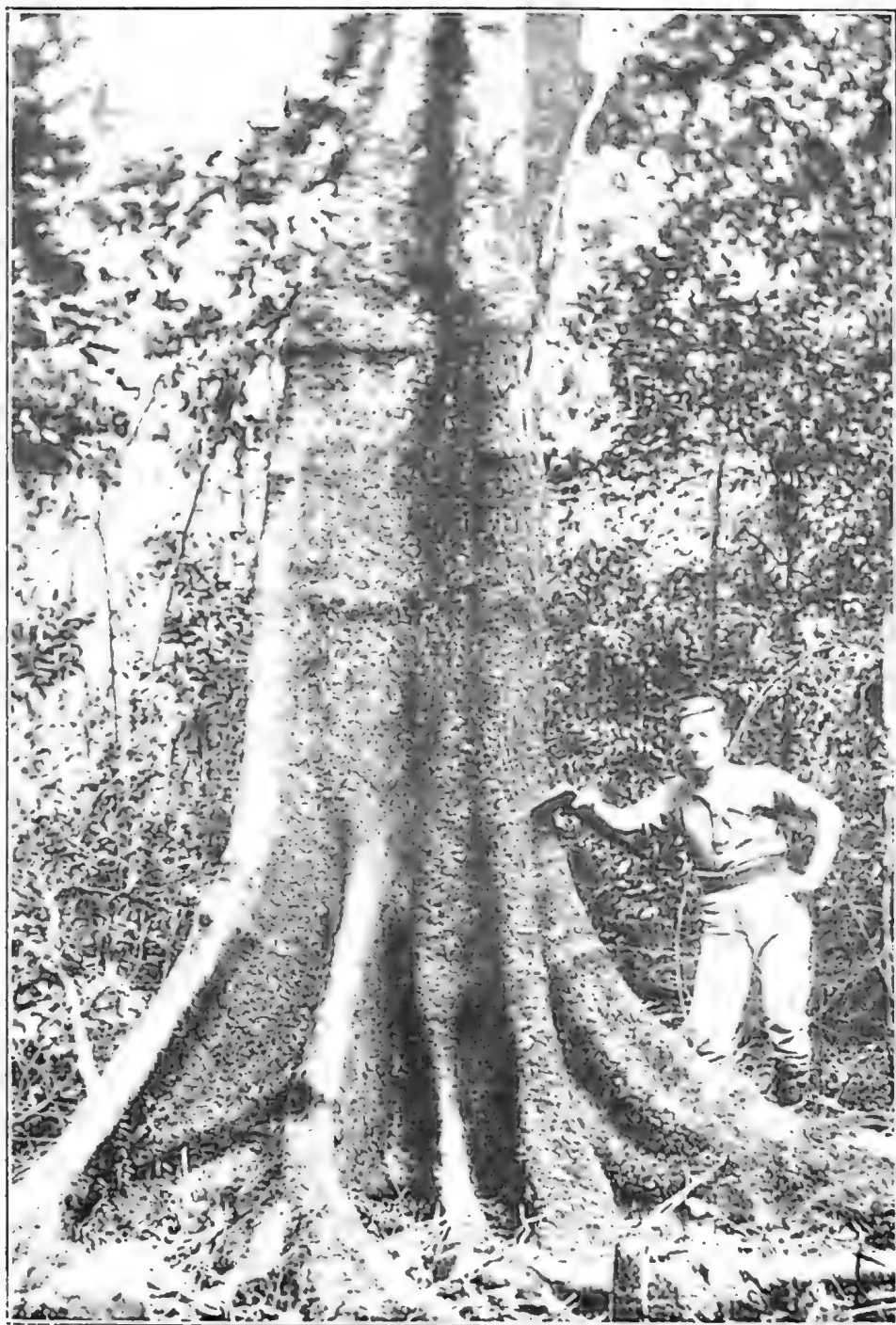


Photo by the Authors.]

PLATE 17.—*PENNANTIA CUNNINGHAMII*.
A specimen in the Ranges eastward of Emu Vale.

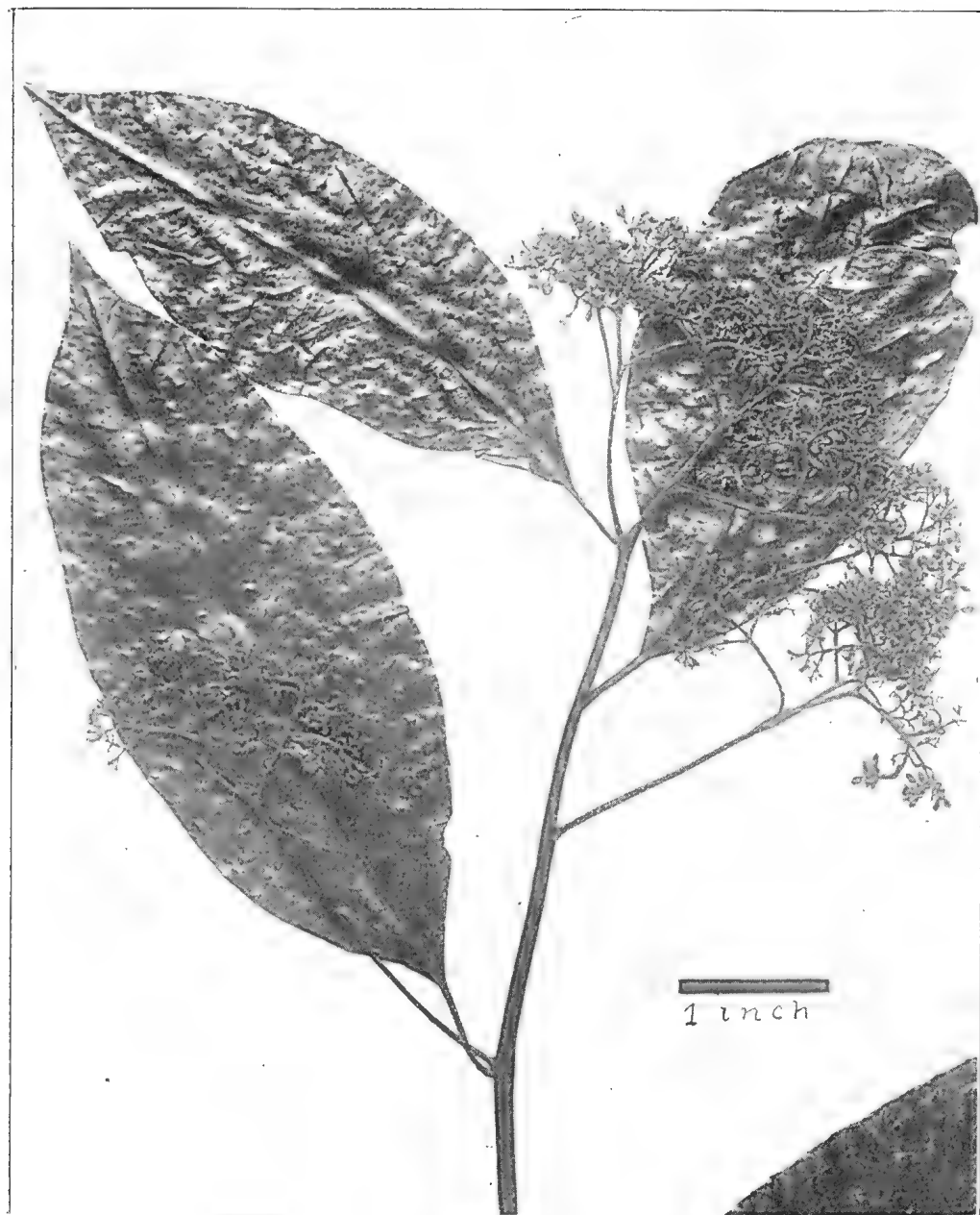


Photo : Dept. Agriculture and Stock.]

PLATE 18.—*PENNANTIA CUNNINGHAMII*. FLOWERING TWIG.



PLATE 19.—THE GRAND PARADE, ROYAL NATIONAL EXHIBITION, BRISBANE, 1922.

Photo : Dept. Agriculture and Stock.]

ROYAL NATIONAL EXHIBITION.

Perfect weather, typical Queensland days, favoured the 1922 Exhibition of the Royal National Association. The Show was a pageant of prosperity, a small-scale representation of the rural richness of a great State, and a triumph of organisation and achievement.

This year the Court of the Department of Agriculture and Stock, attractively and artistically set out, presented many new features. The quadrangular court, with its various exhibits and trophies, showed a striking uniformity of arrangement; and the harmony of the colour scheme, between the soft rendering in shades of grey and ivory white, relieved with maroon, and the blending of the natural shades of green of the palms, staghorns, ferns, and festoons, appealed irresistibly to æsthetic taste.

A presentation of exhibits in a right atmosphere was in itself a fitting prelude to what really was a most practical exposition of the work coming within the scope of the Department. Through their activities and applied interests—so fitly illustrated—its officers render signal service to that large body of producers who are the mainstay of the complex social and industrial life of this great State.

In the Court the observer, the inquirer, and the student were brought into immediate touch with several of Queensland's chief industries—sugar, wool, maize, wheat, cotton, and general agriculture. To them was presented an opportunity for gaining a clear and close insight into certain branches of work, both practical and scientific, engaging the attention of the members of the staff of the Department. As the Brisbane Show is a microcosm of the State, so the Departmental Court is a microcosm of a most important section of the Public Service.

The work of the Bureau of Sugar Experiment Stations found representation in a display of a number of new canes which are under test for the purpose of determining the best commercial varieties for different districts. Some excellent samples of sugar-cane from Banana Pocket, Proserpine district, were also exhibited to illustrate what this rich and fertile locality is capable of producing.

The wool display, with its attractive samples drawn principally from clips sent in to the Wool Branch for classification and sale, was made primarily for the purpose of bringing the work of this section of the Department before small flockmasters, and was indicative also of what is being done by the Sheep and Wool instructional staff.

The part taken by the Stock Experiment Station at Yeerongpilly in the general scheme for the enlightenment of the stock owner was clearly demonstrated by specimens, cultures, diagrams, and printed educational matter connected with the work of a vigorous institution which plays no mean part in the investigation and combating of the tick fever and other problems which harass and at times menace the live-stock industry.

A completeness was given to these two lastmentioned sections by the display of a striking collection of grasses by the Government Botanist, which, on account of their great variety, natural richness, and abundance in good seasons, afford unmistakable proof of the fact that the State possesses an inheritance worth millions of pounds sterling per annum to the stock owners—a heritage which obviously deserves more consideration than it has yet received.

In the comprehensive trophy devoted to General Agriculture prominence was given to maize, and to the methods adopted by the Department in the highly technical and effective work of seed improvement.

What seed selection will do in the matter of increased production and in the standardisation of types of grain, was exemplified in the wide range of exhibits staged. The application of these principles of selection have found practical expression in Departmental crop demonstration areas, and it was shown on the one hand that in a season when the average yield of maize for the State did not exceed 20 bushels per acre, 117 bushels per acre were harvested from prolific strains of selected seed grown under field conditions.

Work of this character, carried as it is into the realms of sound agricultural practice, cannot be otherwise than most helpful to the maizegrower and to the industry generally. The fact that high-yielding strains of seed are available, and are being added to and improved, should engender a feeling of optimism for a future which holds out the promise of increased returns for time and labour spent in production.

A special section was devoted to wheat. It is only within the last few seasons that this most important cereal has attained such distinction as a crop for Queensland, and in many localities it is used for the dual purpose of fodder and grain—fodder, primarily, for the production of milk and for sheep-raising, and grain as the chief support for the industrial life of the community.

It is generally conceded that the existing scheme for the co-operative marketing of wheat under the pool system has done much to place the industry on its present firm footing.



Photo : Dept. Agriculture and Stock.]

PLATE 20.—THE OPENING CEREMONY, ROYAL NATIONAL EXHIBITION, BRISBANE, 1922.
HIS EXCELLENCY LORD FORSTER, GOVERNOR-GENERAL, ADDRESSING THE ASSEMBLAGE.

Another and most important reason for this improved position is that better and more reliable varieties of wheat are now in cultivation. There is less danger from rust than formerly, and the milling qualities of the grain have also been much improved.

For many years—practically a quarter of a century—the Agricultural Department has directed effort to the improvement of existing varieties. As a result, many excellent wheats were produced and brought into cultivation. Crossbreeding and selection, and the highly technical work in the evolution of new varieties, has been carried out for a number of years at the Roma State Farm. This is correlated with the work of the field staff. An interesting illustration of what has been accomplished was on exhibition, and a fine collection of new crossbred wheats from the Wheat Breeding Farm and demonstration plot areas were also staged.

Details of the scheme for the "Improvement and Classification of Existing Varieties of Wheat," which was recently brought forward by the Department and approved of by the Advisory Committee of Agricultural Council and the Wheat Board, were set out in detail on the wheat trophy, for the express purpose of disseminating information to growers interested in the subject. Effect has already been given to the scheme, which has been put on a practical working basis.

The display by the Pure Seeds Branch of the Department was of a most instructive character, and covered concisely the purity and germination of seeds, commercial seeds and seeds of poisonous plants, and demonstrated clearly the part played by the Department of Agriculture in protecting the interests of farmers.

Another informative feature was an exhibit prepared by the Government Botanist, which proved to be of absorbing interest and concern to stockowners and primary producers generally. This exhibit was made up of mounted specimens of well-known edible shrubs with which Queensland is particularly well endowed, also a number of specimens of plants reputed to be poisonous to stock.

The branch of the Department controlled by the Entomologist and Vegetable Pathologist illustrated graphically the life histories of various insects. Another section dealt exhaustively with the Banana Beetle Borer and its depredations.

The *Queensland Agricultural Journal* was represented in the departmental display, and a branch office was located in the Court for the enrolment of new subscribers, and for the convenience of inquirers on agricultural subjects, and matters relating generally to departmental activities.

A new feature introduced into the Departmental Court this year was an extensive and finely grouped display of secondary products from the State Cannery, in which prominence was given to a comprehensive assortment of fruits, jams, preserves, and sauces. The "get up" of this display provided convincing evidence of the expertness of the State Cannery staff in the preparation of products for market, and was worthy of commendation by the most exacting commercial critic.

DEPARTMENTAL COURT EXHIBITS.

SUGAR EXPERIMENT STATIONS.

The Bundaberg Sugar Experiment Station exhibited a number of new varieties, many of them being seedling canes raised in Queensland, Hawaii, Mauritius, India, and Java. Full descriptions of these appeared upon the cards attached to the canes, which also gave their commercial cane sugar content. Many of these canes are at present undergoing chemical and field tests, while others have passed the probationary period, and are being distributed to canegrowers. Of these the most successful so far have been Queensland 813, 970, 1098, Java E.K. 1, E.K. 28, India Shahjahanpur No. 1, Hawaii 146 and 227. These, however, only comprise a small portion of the canes which have been distributed from the Sugar Experiment Stations in the course of the past twenty years. Prior distributions include such well-known canes as Badila and the Corus, which are very largely grown in North Queensland. One of the principal objects of the Experiment Station is the constant introduction of new varieties and their commercial testing. Before any variety is allowed to leave the Experiment Station it is subjected to chemical and commercial trials through plant, first ratoon, and second ratoon crops. Each variety is tested not fewer than four times during the sugar season, so that records are obtained which afford farmers and millowners information as to whether canes are early or late, and as to whether their sugar contents are sufficiently high to warrant their adoption. This is combined with agricultural trials on the field, so that it may be determined whether such variety is a good cropper. It is further rigorously watched for evidence of disease, and no affected cane is allowed to go into distribution. When a variety has passed this trial it is carefully examined and packed before being sent to growers living at a distance from the Station. Farmers close at hand are permitted to visit the local



Photo : Dept. Agriculture and Stock.]

PLATE 21.—THE JOURNAL CORNER, COURT OF THE DEPARTMENT OF AGRICULTURE AND STOCK.



Photo: Dept. Agriculture and Stock.]

PLATE 22.—A VIEW OF THE COURT OF THE DEPARTMENT OF AGRICULTURE AND STOCK



Photo : Dept. Agriculture and Stock.]

PLATE 23.—PURE SEEDS BUREAU DISPLAY, COURT OF THE DEPARTMENT OF AGRICULTURE AND STOCK.



Photo: Dept. Agriculture and Stock.]

PLATE 24.—CENTRAL COTTON TROPHY, COURT OF THE DEPARTMENT OF AGRICULTURE AND STOCK.

Station and remove any variety selected for distribution. All canes are distributed free to canegrowers. Worthless varieties are discarded.

Information of this kind could only be secured by growers and millers at the cost of much time and money, and the rejection of many useless canes by the mills would obviously be accompanied by severe loss to the growers.

As an adjunct to the work described the Experiment Station at Innisfail is now raising cane from seed.

Work at the Experiment Stations also comprise the study of soils, cultivation, and fertilising. It is sought to introduce improved methods of cultivation, liming, fertilising, rotation of crops, and conservation of moisture; and growers are taught the principles of cultivation and business methods by visits to the Experiment Stations, and by lectures and addresses delivered in the several sugar districts, and by bulletins. It may be claimed that this work has been highly successful as the following figures will show:—

INCREASE IN CANE AND SUGAR PRODUCED PER ACRE AND DECREASE IN TONS OF CANE REQUIRED TO MAKE ONE TON OF SUGAR.

Period.					Average tons of Cane per Acre.	Average tons Sugar per Acre.	Average tons of Cane to one ton of Sugar.
1899-1908	..	..	..	..	14.76	1.60	9.20
1909-1918	..	..	..	..	17.37	1.99	8.68

The Sugar Experiment Stations analyse soils free for canegrowers, and advise, by personal interview or by letter, on the requirements of the soil in the way of application of lime where necessary, green manuring, and fertilisers, and the treatment of the land by proper cultivation. Cane samples are also tested free of charge, so that growers may know the best time at which to cut their cane. Field officers also move around among farmers giving advice on cultural operations.

Investigation and research work in connection with the sugar-cane's most serious pest—the grub—is now being carried out by the Bureau of Sugar Experiment Stations in a systematic manner, and numerous bulletins have been issued upon the subject. The Entomological Laboratories are situated at Meringa, near Cairns, which is the centre of the worst grub-infested region in North Queensland. The work now undertaken includes:—

Morphological study of reproductive organs of beetles, with relation to the period of ovipositing and the number of eggs produced.

Morphological study of the fungus parasites.

Breeding of the various local parasitic and predaceous insects in cages.

Introduction and breeding of beetle parasites from other countries.

Experimental methods for the rapid multiplication and wide distribution of our fungus parasites.

Introduction of bacterial and fungus enemies of the beetles from other countries.

A further study of various light-traps for the beetles.

A further study of repellents.

Field and Laboratory experiments in the use of poisons for grubs.

Field experiments to determine the relation of fertilisers to resistance; using green manure, stable manure, meatworks' refuse, nitrate of soda, and other substances.

The work of the Sugar Experiment Stations, therefore, in relation to its promotion of the agricultural welfare of Queensland in connection with the sugar industry cannot be over estimated. When it is considered that this industry is the greatest agricultural one in Queensland, with an estimated yield this year of 285,000 tons of sugar, computed to be of the value of over £9,000,000, it can be seen how highly necessary it is that it should be assisted and encouraged in every possible way.

Apart from its economic value, it has a supreme national significance and has already proved a valuable factor in peopling the North. According to the last census the increase in population in the last ten years of the Herbert Electoral Division was 19.4 per cent., or 14,929 persons—a greater increase numerically than in any other part of the Commonwealth.

THE A.S.P.A. COURT.

The main portion of the task of fittingly representing Queensland's foremost agricultural industry was allotted to the Australian Sugar Producers' Association. Text and picture illustrated the importance to our economic life of this great staple, and incidentally strongly emphasised its political significance in respect to our effective peopling of the North.

A series of photographs in careful sequence enabled one to follow the story of sugar from the planting of the cane to its final emergence as a marketable commodity. The several phases of the great industry, a combination of agriculture and manufacture, were strikingly depicted, and they conveyed a lesson in economical co-operation by the evidence of the value of sugar and its by-products to other business enterprises. The educational value of the exhibits in this Court was immense. The connection, for instance, between cane and power alcohol was shown by interesting stages, and the comprehensive nature of the Court and telling texts panelled appropriately conveyed convincingly to the public the high value of an industry around which cities, towns, and thriving districts have been built. The facts and figures displayed provided much room for thought and stimulated support for an industry that has become a corner stone of the White Australia policy. As an example it was shown that 15,000 tons of raw sugar, valued at £1,365,000, will pass over the Cairns wharves this season. Then a vista opened up of extended fields of vibrant industry, the roots of which strike deeply into the soil of Queensland canefields, and the branches of which spread widely through shipping, manufacturing, and commercial spheres. Follow the raw product to the mill, thence to the refinery, on to the market, to its ultimate absorption into other industries, and one gains an idea of what the engineering and machinery trades and the manufacturing and distributing interests owe to Queensland sugar. When all this is considered, besides the canegrowers' gaining their living direct from the land, and the thousands of workers—white Australians—employed in harvesting and handling the products of the sugar and allied enterprises, the economic importance of the sugar industry is understood.

COTTON.

The revival of cotton-growing in Queensland has opened up a wide and alluring vista of prospective prosperity arising from our vast reserves of untouched fields. Already the bright promise of the present revival has stimulated a strong interest in the textile trade, and the more optimistic have already pictured Queensland not only as the cotton State of the Commonwealth, but the new home of a thriving textile industry.

At the Exhibition the Department of Agriculture and Stock and the Australian Cotton-growing Association served efficiently a wide public interest. In the departmental Court a striking central trophy, the work and design of Mr. H. W. Mobsby, F.R.S.A., typified a coming Queensland industry and symbolised the wealth that will roll in fleecy billows from the linters and looms of Queensland cotton gins and spinning mills when the forces of field and factory have been allied and applied to the establishment and advancement of a new and great Australian industry.

A small cotton gin at work attracted an interested crowd, and the operation of separating lint from seed was watched with marked attention. Probably no other crop has "caught on" so quickly with the Queensland farmer as cotton, as it represents a cash return within six months of planting the seed. Under the existing guarantee system, returns have often exceeded £35 per acre gross.

Already, with only a few thousand acres under cotton, a sum of £90,000 sterling has been paid to growers for their crop. To date, sufficient seed has been supplied to plant over 65,000 acres, representing a prospective increase in the area to be put under crop this year of approximately 60,000 acres.

The existing arrangement, entitling growers to an advance of 5½d. per lb. for seed cotton until 30th June next year, has been extended by the Government in the form of a guarantee for a further period of three years from the 1st August, 1923, to the 31st July, 1926. For the first year of the new guarantee period—that is, from 1st August, 1923, to 31st July, 1924—the advance will be arranged on a sliding scale basis in accordance with the grade of cotton, with a maximum price of 5½d. per lb. for seed cotton of good quality free from disease and of 1½-inch staple. The details of the advance during the remainder of the extended period—namely, two years—will



Photo : Dept. Agriculture and Stock.]

PLATE 25.—WOOL EXHIBIT, COURT OF THE DEPARTMENT OF AGRICULTURE AND STOCK.



Photo : Dept. Agriculture and Stock.]

PLATE 26.—THE STATE CANNERY DISPLAY, COURT OF THE DEPARTMENT OF AGRICULTURE AND STOCK.



Photo : Dept. Agriculture and Stock.]

PLATE 27.—PANELS OF WHEAT, SUGAR CANE, AND GRASSES, COURT OF THE DEPARTMENT OF AGRICULTURE AND STOCK.

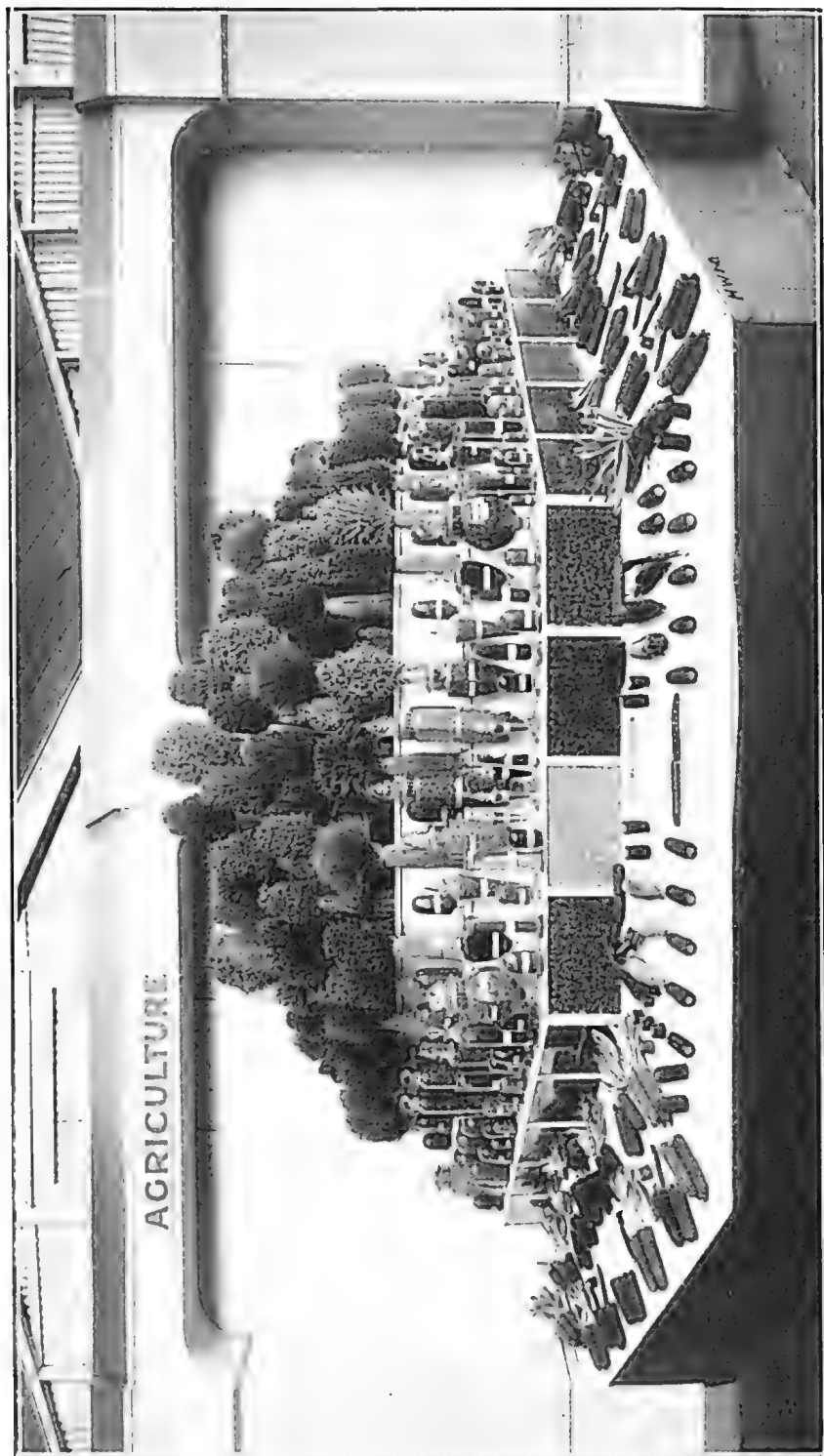


Photo : Dept. Agriculture and Stock.]

PLATE 28.—GRAIN EXHIBIT, COURT OF THE DEPARTMENT OF AGRICULTURE AND STOCK.

be determined later. A condition is made that the seed must be procured from the Department of Agriculture.

The activities of the Australian Cotton-Growing Association, and the establishment of up-to-date ginning plants to deal with the crop, have had an excellent effect also in placing this industry on a solid foundation.

THE FRUIT DISPLAY.

Dominating the fruit display was the fine central trophy and its supporting array of orchard products, which formed the non-competitive collection shown by the Southern Queensland Fruit Growers' Society. The society provides a striking example of the benefits of organisation as applied to fruit production and distribution, and the wonderful display of fruit from sub-tropical gardens and the temperate Granite Belt was attractive evidence of its well-directed activities. Represented in the collection were Montville, Mapleton, Perwillowen, Nambour, Bli Bli, Yandina, Weombye, Palmwoods, Elimbah, Ormiston, Cleveland, Manly, and Wellingtton Point. The Blackall Range generally sent some of its choicest citrus products from its peaceful, picturesque, and profitable groves; the North Coast contribution was made up largely of pineapples and bananas; and the South Coast was creditably represented by strawberries and custard apples. The pineapples and papaws were large, the largest of the latter weighing 12 lb., while many of the former were as big as melons. In conjunction with the meritorious exhibit of the S.Q.F.S. was a demonstration of a patent fruit-grader. The Summit (Stanthorpe District) Fruit-Growers' Association sent an excellent collection of apples, which headed the honour list in their classes.

THE BOONAH RURAL SCHOOL.

Established only two and a-half years ago, the Boonah Rural School by its remarkably fine display showed evidence of wonderful progress, controlled enthusiasm, latent and developed skill, and the team-work spirit. The versatility of the pupils in design and craftsmanship was a revelation of the adaptability of the young Australian. The aim of the school is to turn out boys and girls well equipped with



Photo : Dept. Agriculture and Stock.]

PLATE 29.—BOONAH RURAL SCHOOL DISPLAY.

knowledge and skill that can be applied to the daily duties of a rural vocation. Maize-growing, milk and cream-testing, photography, poultry-raising, forestry exhibits, artificial grasses, pot plants, electrification of seeds, kindergarten work, woodwork, tinwork, leatherwork, dressmaking, millinery, cookery, laundry work, knitting, soap-making, silkmaking, confectionery, jams and preserves, cordials, preserved vegetables, flowers—these are some of the things that occupy the attention of the pupils of the Boonah Rural School, and assisted to make up an exceedingly creditable and interesting display.

WOOL SECTION.

In this section some very high class wools were shown. With a few exceptions all the fleeces staged were selected from wools handled under the "Farmers' Wool Scheme."

The fleeces were ticketed with the qualities and price per pound realised on sale, and the very best wools in Queensland were represented in the exhibit.

The "Farmers' Wool Scheme" has now been in operation for five and a-half years. Over 200 farmers have taken advantage of the scheme with satisfactory results to them. In the course of that period over 1,000 bales have gone through the departmental wool room, and considering that the limit of numbers in a flock has been placed at 1,500, this record is commendable. Included in consignments from almost every district in Queensland were clips ranging in quantity from one fleece up to twenty-seven bales. The North, as far as Burketown, most of the islands off the coast, the Far West, the coastal areas from the Tweed to Cairns, the Darling Downs, Peak Downs, and other Central district areas all sent a quota. The top price, 22½d., was received for coastal wools. The general average price right through the total works out at about 15d. per pound for all qualities. When it is remembered that the great bulk of farmers' wools is crossbred these results are very good. Latterly, however, coarse, burry and seedy crossbreds have been almost unsaleable, and in consequence the average price was reduced considerably.

Under this scheme the advantages to the small sheep farmer are many.

First.—In small quantities, his wool goes into the dags and butt sales, quite untreated. Some of the sorts may be worth, say, 18d. per pound and others as low as 3d. per pound. The buyer does not know the amount of good, bad, or indifferent wools in his consignment, and to protect himself he buys at the lowest quality price he sees.

Second.—No commission is charged, and, if required, an advance of 60 per cent. is given on receipt of wool in the departmental store.

Third.—As all the wools are pooled, the wool goes into the store as a big clip and so the charges are lighter by nearly one half.

Fourth.—If in good condition the farmers' own bales are used to repack, and a considerable saving is thus effected.

Fifth.—Skilled wool classers deal with the wools, thus ensuring evenness of "get up." There has been nothing but praise for the "get up" of the wools offered in the sales since the inception of the scheme.

The wools shown in the Wool Section at the National Association Grounds represent samples of the best received by the Department, but these illustrate the fact that any man with care and knowledge can grow wool quite equal in quality to the larger sheep farmers. No man need grow bad sheep and indifferent wool, and it is well known that ten ill-bred neglected sheep are not as good as five good animals.

In a sort of process of evolution all countries tend to subdivide and resubdivide, until the greater flocks of hundreds of thousand and tens of thousands come down in size approximating to those of the older lands, where 1,000 sheep is a large flock; the aggregate numbers on the land being very much greater than where great flocks range over extensive areas.

In Great Britain, for instance, they run on an area one-tenth of the size of Queensland sheep districts, 7,000,000 or more sheep, as many cattle as Queensland, besides horses and swine in great numbers. Queensland will some day run treble the numbers of stock she runs to-day when there are sufficient people to actually occupy and make full use of the land.

Sheep are as much a tool of a farm as ploughs or harrows. This is the teaching of history. Sheep were well named "Golden Toe" in ancient writing. Actually they were the first animals to be domesticated, and in this connection the Biblical quotation may be cited, "Abel was a keeper of sheep, but Cain was a tiller of the ground."

An officer was on duty at the Court during Show Week, to explain or instruct sheep farmers or would-be sheep farmers in all matters pertaining to the business, and free pamphlets were available to all who were interested in one of Queensland's great staple industries.

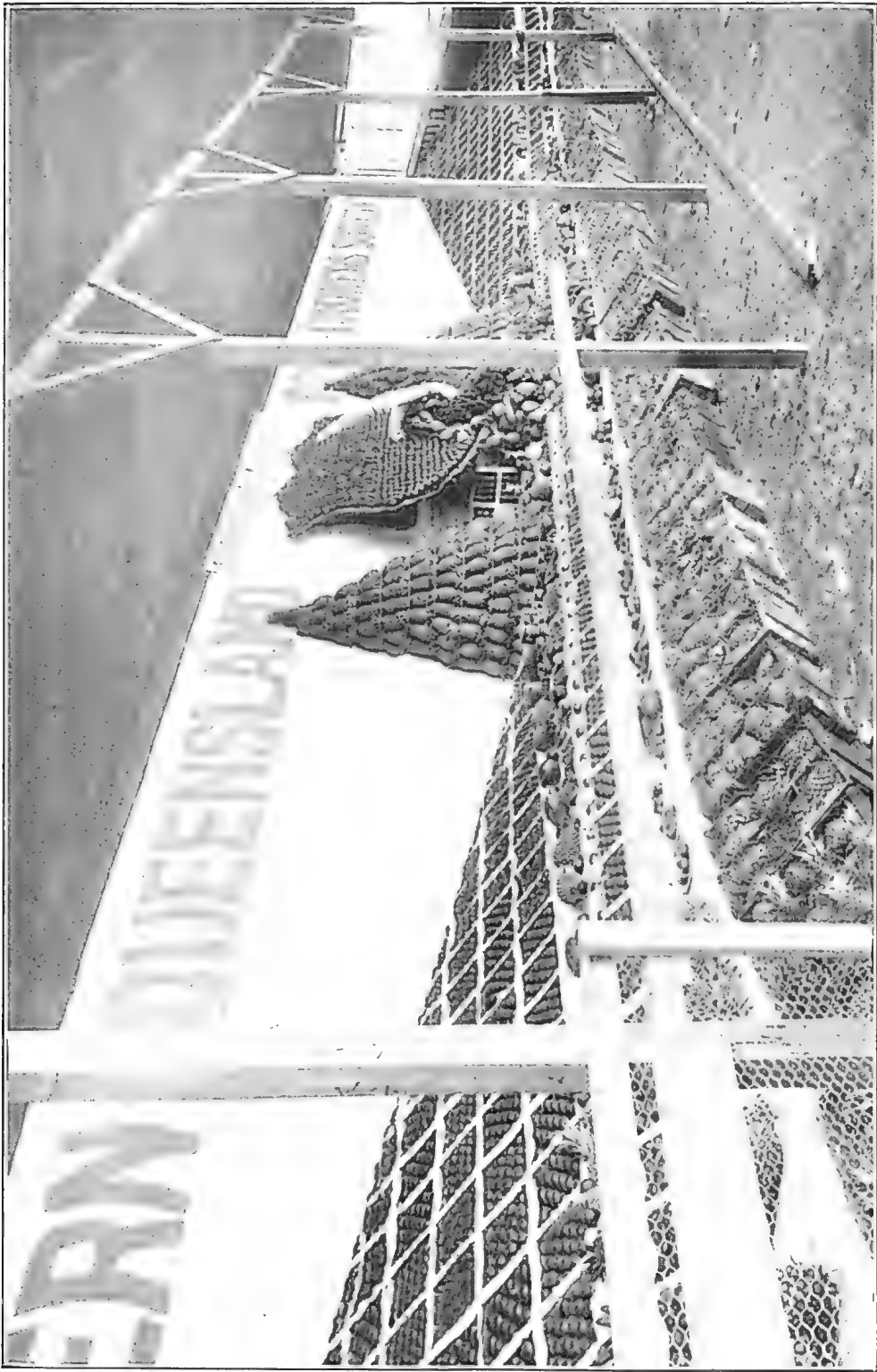


PLATE 30.—THE FINE DISPLAY OF THE SOUTHERN QUEENSLAND FRUITGROWERS' SOCIETY



Photo : Dept. Agriculture and Stock.]

PLATE 31.—SUGAR COURT—THE AUSTRALIAN SUGAR PRODUCERS' ASSOCIATION DISPLAY.

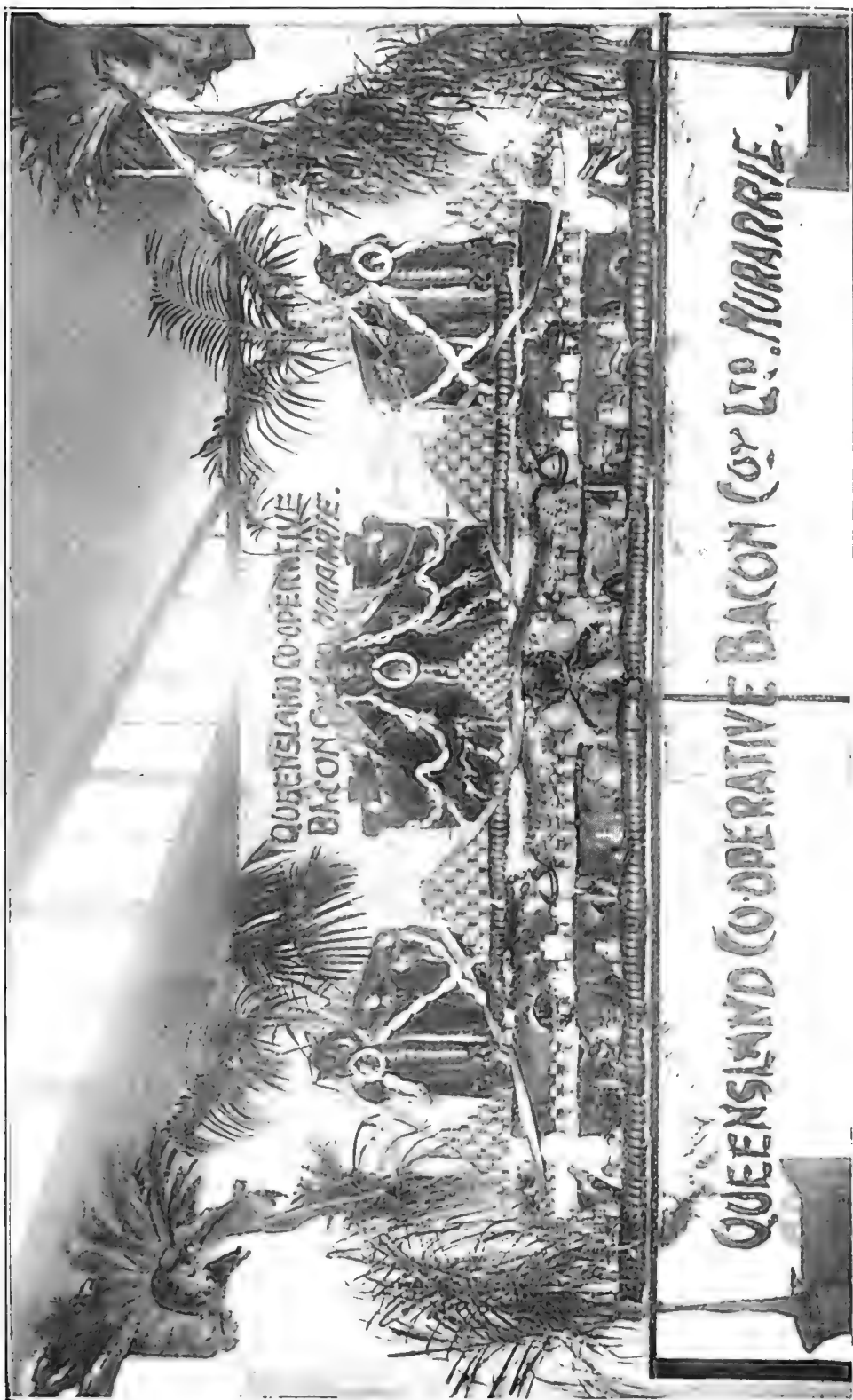


PLATE 32.—DISPLAY OF PRODUCTS FROM THE CO-OPERATIVE BACON FACTORY, MURARREE.



PLATE 33.—THE GOVERNOR-GENERAL (LORD FORSTER), AND PRESIDENT C. E. MCDUGALL INTERESTED IN THE JUMPING.



PLATE 34.—THE STATE GOVERNOR (SIR MATTHEW NATHAN), CONGRATULATING THE DRIVER OF EDNA WILKES ON HIS WIN.

STOCK DISEASES EXPERIMENT STATION, YEERONGPILLY.

Tick Eradication.

That the cattle tick continues to be a serious menace to our live stock industry was well illustrated by the numerous specimens exhibited showing its life history and development. Apart from heavy mortality from tick fever, the tick is the direct cause of injury to the hide and consequent depreciation in value.

Tick-infested cattle, apart from constant irritation, require more feed, while ticky cows give less milk.

The work of tick eradication was illustrated by numerous maps and diagrams.



Photo : Dept. Agriculture and Stock.]

PLATE 35.—STOCK INSTITUTE DISPLAY, COURT OF THE DEPARTMENT OF AGRICULTURE AND STOCK.

A striking feature of this interesting exhibit was a map and diagram showing what has been accomplished in tick eradication work in the United States, America, and in South Africa. In the first-named country there were originally 741,515 square miles tick-infested and under certain quarantine restrictions. For several years propaganda work was carried out by the officers of the Federal and various State Governments, assisted by Agricultural Societies, Stock-breeders' Associations, Farmers' Institutes, County Councils, Banking Institutions, Railway Companies, Manufacturers of Agricultural Implements, and in no small measure by the general public. The tick-infested area covered the whole or part of fifteen of the Southern States, stretching from the Atlantic to the Pacific Coast. On the 1st July, 1906, systematic tick eradication commenced, and up to the present time 510,000 square miles have been cleared up and released from quarantine restrictions. This area is equal to two-thirds, or nearly 70 per cent., of the original tick-infested country.

This great achievement has been accomplished primarily as a result of active propaganda and organisation by the staff of the Federal and State Departments of Agriculture for at least twelve months, followed by united efforts on the part of stockowners and others interested in the live stock industry.

In South Africa tick eradication has proved a great success. In Swaziland, with an area of 6,500 square miles, there are over 260,000 cattle which had to be dipped at least every three to five days. In the course of the past five years the cost of control, including erection of dipping tanks, dipping material, and European and native supervision, works out at 1s. 1d. per head of cattle per annum.

It should be pointed out that the Queensland cattle tick lives on the ground apart from its host for about six months, and that by dipping cattle on a farm every fourteen days for eight months will surely free the place from ticks.

The tick which causes East Coast fever is extremely hardy and can live on the ground apart from its host for over twelve months; therefore, it is absolutely necessary for dipping operations to be continued for at least fifteen months to clean the country and before quarantine restrictions can be removed. Moreover, as this tick has a preference for attaching and sheltering itself in the matted hair of the brush of the tail and in the depth of the ears, it necessitates hand dressing of these parts.

The overcoming of all obstacles and the successful results achieved in America and South Africa completely refutes the frequent assertions that tick eradication by dipping is impracticable in Queensland.

Contagious Abortion in Cattle.

This disease causes very serious trouble among dairy cattle, and is caused by a micro-organism, the bacillus *Abortus*, which was discovered by Professor Bang, of Copenhagen.

The exhibit showed examples of the organism growing artificially in tubes of Agar jelly in a partial vacuum as the germ has more or less a dislike to access to free oxygen.

There were also a series of tubes showing the method of testing the blood and milk of suspected infected animals by the agglutination test.

The staff at Yeerongpilly Experiment Station undertakes to examine specimens.

Should any farmer have reason to suspect that he has this infection among his cattle he should at once write for advice to Stock Experiment Station, Yeerongpilly.

Poultry Diseases.

Bacillary White Diarrhoea of Young Chickens.—This serious trouble causes a heavy mortality, from 60 to 80 per cent., among young chickens from five to twenty days old.

It is caused by a germ which lives within the oviduct of the hen. A proportion of eggs laid by an infected hen hatch out infected chicks, and the excretions of these spread the disease to the other birds in the brood. It has been proved that chicks that recover from the disease may carry the causative micro-organism in the ovary and serve as a source of infection in the future. Outbreaks of this disease could be controlled readily by sanitary measures, but infection through the egg must be prevented by a process of weeding out the carriers among the hens used for breeding. The exhibit displayed cultures and drawings of the bacillus *Pullorum*, the cause of white diarrhoea in chickens, also a series of tubes illustrating the application of the agglutination test on the blood of suspected birds.

Blackleg.

A specially attenuated vaccine for the prevention of blackleg in calves was exhibited. Its efficiency is proved by the fact that it protects over 99 per cent. of over 100,000 calves treated.

Other specimens of vaccine included those of contagious mammitis, strangles, abscess, and natural lymph for protection against pleuro-pneumonia.

Another section of the exhibit demonstrated the absolute necessity for cleanliness in connection with the production and handling of milk, and illustrated by means of plates, cultures and diagrams the benefits and advantages of pasteurisation. It was pointedly indicated that if every farmer were to scald the milk before feeding it to pigs and calves, there would be a considerable reduction in the number of these animals affected with tuberculosis.

Official records show that of 131,783 pigs killed at the bacon factories under Government inspection there were found 9,362 carcasses showing lesions of tuberculosis.

A collection of preserved pathological specimens illustrating the various manifestations of tuberculosis, tick fever, blackleg, contagious mammitis, and other stock diseases was another educative feature of a distinctly valuable display.



PLATE 36.—THE COTTON PICKER.

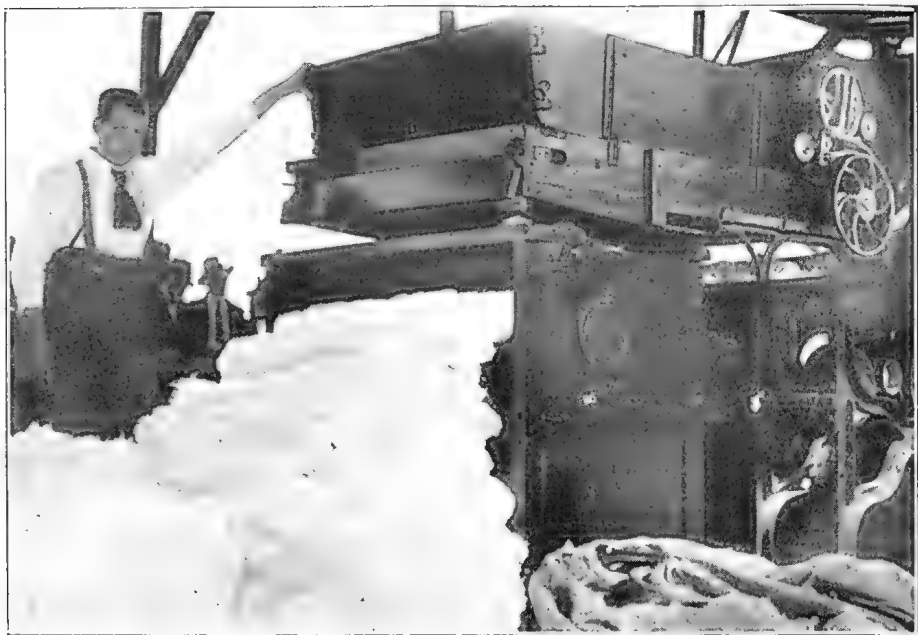


Photo : Dept. Agriculture and Stock.]

PLATE 37.—FLEECY BILLOWS OF LINT—COTTON-GINNING AT THE BRISBANE EXHIBITION.



Photo : Dept. Agriculture and Stock.]

PLATE 38.—WEST MORETON DISTRICT EXHIBIT, FIRST IN "A" GRADE.



Photo : Dept. Agriculture and Stock.]

PLATE 39.—PIALBA DISTRICT EXHIBIT, FIRST IN "B" GRADE.



Photo : Dept. Agriculture and Stock.]

PLATE 40.—DAWSON VALLEY EXHIBIT.



Photo : Dept. Agriculture and Stock.]

PLATE 41.—WINNING EXHIBIT, ONE MAN FARM COMPETITION.

THE BOTANICAL DIVISION.

Weeds.

A representative collection of weeds, a source of trouble to horticulturists, agriculturists, and pastoralists throughout the State, was among the departmental displays. Most of these may be listed among the many undesirable importations from which Australia has suffered great economic loss. Many entered with seeds of economic plants, and by other agencies, such as straw for packing, and imported fodder. Some were introduced as ornamental garden plants, and having strayed from cultural control have become the pests we now find them. Among these are the billy goat weed, prickly poppy, and lantana. Some of the most obnoxious have been introduced for hedge-making, a disastrous example being the common prickly-pear. Hold-me-back or wait-a-while is another plant introduced for hedge-making that has become a curse in many scrub localities. Rank growing inkweeds, stinking rodger, wild cotton, and rag weeds are troublesome on newly-cleared and neglected cultivated lands, and of late years the federal weed, so called from its being first observed about the time of Federation, has spread on the newly-cleared scrub lands of the State. The khaki weed is an unwelcome visitor which is said to have been introduced from South Africa at the time of the Boer War, the needle-like burrs with which it is abundantly furnished cause great annoyance and detract from any fodder value the plant may possess. Quite a number in the collection may be termed noxious on account of their poisonous properties or harm they may cause to stock. Among these are the wall-flowered or heart-leaf poison bush, fuchsia bush, peach leaf poison, thorn apples, ironwood, and pimperl. Many plants of the genus *Cassia* or Wild Sennas are continually being sent in as suspected of poisoning stock, the only harmful way in which these plants act, however, is as drastic purgatives. The question of plants poisonous or harmful to stock is one of the most complex that faces the botanist, veterinarian, and chemist alike, and one that calls for a good deal of scientific investigation in the State. Farmers and the public generally are once more reminded that the departmental officers are always willing and ready to report, free of charge, on any specimens of weeds, suspected poisonous plants, or other specimens forwarded to them. Each specimen in the collection is labelled with both the common and botanical names, and full information as to its properties and uses are supplied.

Grasses.

Queensland has always had a reputation for the richness of its pastures and the comprehensive collection of indigenous grasses and forage plants staged by the Department bears testimony that this distinction is fully justified. Among the *Andropogons* are the far-famed and fully appreciated blue grass and satin top, the former being one of the very best for fattening and grazing purposes, though not particularly drought resistant. The genus *Astrebla* comprises the highly-esteemed Mitchell grasses, of which four very distinct kinds are found in Queensland; the chief characteristic of these and some other of inland species of grasses and herbage is the tenacity of life which they possess, their drought resisting properties, and the rapid manner in which they respond to falls of rain after long periods of drought make their value in this respect nothing short of marvellous. Among the Star grasses, to the same genus of which belongs the imported Rhodes grass, are several varieties esteemed for their fodder value. The genus *Anthistira* contains the well-known kangaroo grass and a near ally of this is the Flinders grass, which in a green and a dry state is so much relished by stock. Blady grass although a coarse grower is eaten by stock when it is young, especially the new growth that follows a burn off. This grass is of economic importance from its value as material for paper making. Quite an array of panicums was on view, most of them possessing high feeding values. Beautiful grasses are various *Eragrostis* or love grasses. The button grass and the crow foot are cosmopolitan species, the first named being a most valuable sheep fodder. Brown top bears a good reputation among some stockowners. Several species of native *paspalum* were shown. Native sorghums are of large growth, but when cut both horses and cattle do well on them. Coastal grasses were represented by spinifex, coast couch, and several dune grasses useful as sand binders. Among the grasses especially adapted for wet or swampy situations are water couch, rice grass, *panicum proliferum*, *panicum obseptum* (a particularly good grass for wet places), and two sorts of *chamæraphus* or swamp couch.

Edible Trees and Shrubs.

Among the more remarkable and valuable features of Australian vegetation are the edible shrubs and trees of our inland scrubs and open country. The collection shown of about thirty sorts proved most interesting and instructive to stockowners, pastoralists, and agriculturists generally. Among the many sorts especially noted were the mulga, kurrajong, apple tree, wild orange, native pomegranate or bumbil, belah, emu bush, whitewood, myall, cattle bush, cotton bush, and



Photo: Dept. Agriculture and Stock.]

PLATE 42.—RESTING. A GLIMPSE OF THE JUDGING RING.



Photo: Dept. Agriculture and Stock.]

PLATE 43.—A POPULAR PRIZE-WINNER: NOT MUCH TO LOOK AT, BUT A
“BLUE RIBAND” WALKER.

various salt bushes. All these and others have helped to keep stock not only alive, but in good condition during prolonged dry spells. The conservation, propagation, and utilisation of these valuable plants is a matter of national importance.

In connection with these exhibits it is again emphasised that officers of the Department are always willing and ready to identify and report on any samples of grasses, fodder plants, weeds, and other botanical specimens about which farmers, pastoralists, or others may desire technical or scientific information.

THE SEED LABORATORY.

Commercial Seeds and Seeds of Poisonous Plants.

The Seed Laboratory exhibit comprised a collection of agricultural and vegetable seeds, ninety of the weed seeds most frequently found in commercial seeds, and stock foods. Tables had been prepared giving the purity and germination of both Australian grown and oversea seeds, with the names of the countries from which the latter were imported. A purity table also listed the principal weed seeds found in samples examined in the course of 1921-1922, and from which it was noted that the poisonous *Datura stramonium* (Thorn Apple) seeds were found in samples of foxtail millet, japanese millet, Sudan grass, and in Queensland grown oats. Seeds of *Melilotus parviflora* (Hexham Scent), a butter and flour-tainting weed, were also discovered in samples of Cape barley, lucerne, and oats; they also frequently occur

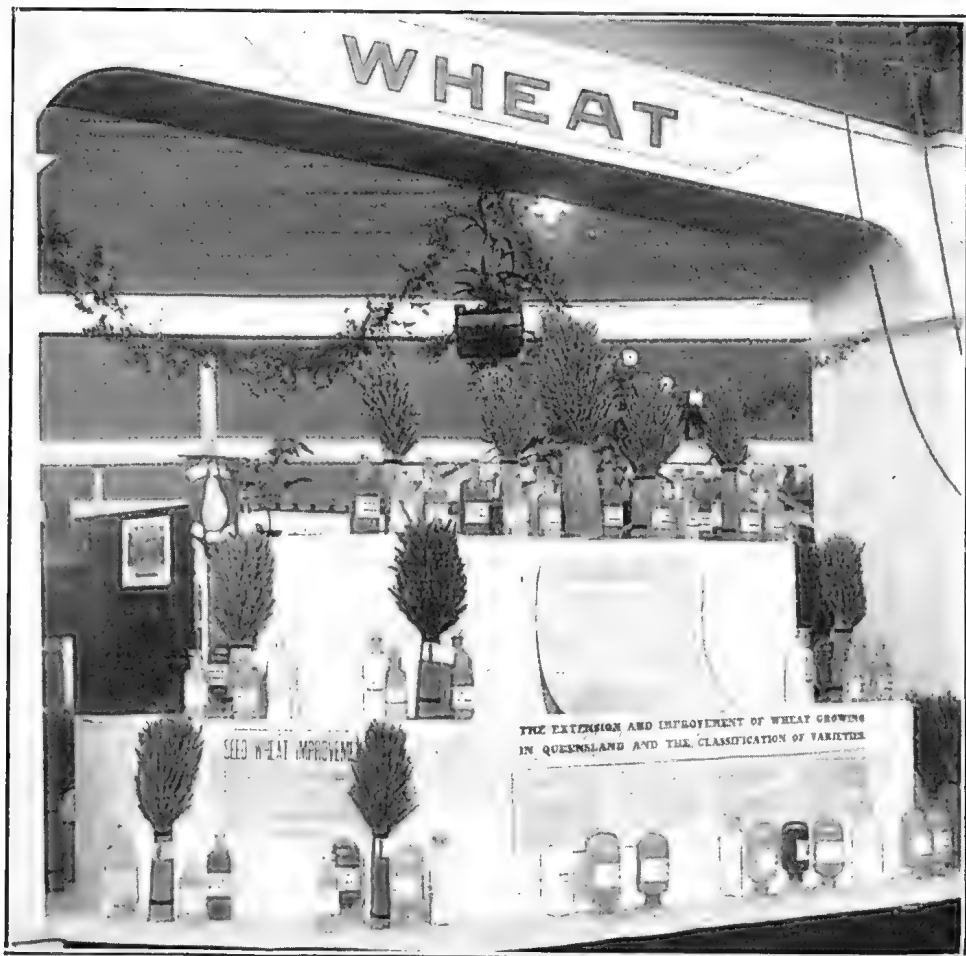


Photo : Dept. Agriculture and Stock.]

PLATE 44.—WHEAT CLASSIFICATION EXHIBIT, COURT OF THE DEPARTMENT OF AGRICULTURE AND STOCK.

in wheat. Another germination table showed that lucerne and black cowpeas often contain a large proportion of hard seeds; seeds with husks so impervious to moisture as to delay germination. When the quantity of hard seeds present exceed 10 per cent. it is obvious that the effective germination is greatly reduced.

Every one should know the purity and germination of the seed that it is intended to sell or sow, also its freedom from hard seeds, insect-infested seeds, or seeds of any plant imparting a taint to butter, or deleterious to the life and health of stock. These matters can only be decided by a scientific examination of a large and truly representative sample, drawn from the bulk in the sender's possession. Seeds constitute the most variable material that the farmer or merchant purchases, and the success or failure of a crop, or even succeeding crops,—may be wholly determined by the condition of the seed sown. No one can afford to leave any doubtful point to chance, and it is but common prudence to ascertain the purity and germination of all seeds before sowing or offering them for sale.

Samples of any seeds purchased or offered for sale as seeds for sowing may be sent to the Department of Agriculture for analysis. It is important that the sender's name and address be plainly written on each sample sent, and the parcel should be accompanied by a covering letter, addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane. The weight of samples must not be less than 8 oz. of barley, cowpeas, beans, maize, tares, oats, wheat; 4 oz. of lucerne, sorghum, sorghum Sudanese (Sudan grass), millet, linseed, canary, prairie grass, cotton; 2 oz. of Rhodes grass, *paspalum dilatatum*, couch grass. A fee of 2s. 6d. is charged to vendors. A vendor is any person who sells, offers or contracts to sell, any seeds.

Free Analysis for Farmers.

No charge is made to farmers in respect to samples of any seeds purchased by them for their own sowing, provided the following particulars are plainly written on each sample sent:—Vendor's name and address; name of seed; quantity purchased; date of delivery; locality where seed is to be sown; name and address of purchaser.

Better Seeds—Better Crops.

The best is the cheapest, whatever the price, and quality should be the one and only consideration that determines a purchase. An opinion as to the quality or condition of any agricultural seed is useless unless based on actual facts revealed by an analysis conducted by uniform scientific methods. This important work is undertaken by the Seed Laboratory of the Department of Agriculture.

ENTOMOLOGICAL AND RELATED EXHIBITS.

The section of the Departmental Court illustrating the activities of the Division of Economic Entomology and Plant Pathology, in charge of Mr. H. Tryon, comprised, as relating to the former, twenty-four cases displaying life-histories of several of our more formidable pests of the orchard and field, as well as those of some of our stock-injuring insects. Thus were brought under notice the potato ladybird, the potato tuber-miner, the potato green caterpillar, the sweet potato web-worm, the sweet potato weevil, the cabbage diamond moth caterpillar, the cabbage stem miner, the cabbage godara caterpillar, the cabbage prodenia caterpillar, the pumpkin beetle, the bean fly, the cereals armyworm, the grain weevil, the grain caterpillar, and the flour-eating caterpillar, the bean and pea weevils, the seven principal cotton-injuring insects. Among orchard pests were shown a series of citrus damaging insects, a series of citrus scale insects, the citrus stem-boring beetle, the so-called Queensland fruit fly, the banana weevil, the generally destructive peach moth (shown as affecting also almond, orange, loquat, guava, cherimoya, castor oil, cotton, and maize), the codlin moth. Stock injurious insects were illustrated by three cases showing sheep blowflies and their life phases and one devoted to the stock injuring "caterpillar" (a saw-fly larva).

These several life histories included not only specimens of the insects concerned, but also illustrations of their injuries and mode of action, indicated by models and water colour drawings, displaying life size and magnified representations. They were prepared by the two Entomologists, Messrs. E. H. Jarvis and H. Jarvis, under

the direction of the Entomologist-in-Chief, and evinced the highest technical skill and scientific discrimination.

Plant Diseases.

Plant diseases proper, restricted in the extent of their display by exigencies of space, were illustrated by coloured plates relating to the following maladies:—Citrus die back, C. black spot, C. fruit dwarfing, C. Maori disease, C. brown rot, C. bud suppression, citrus black spot and lemon scab, potato Irish blight of (a) foliage, (b) tuber, P. nematode root-gall, P. scab, blackleg, and potato leaf spot, apple bitter pit, and pineapple fruitlet core rot. In this case, the nature prints were made by Mr. H. W. Mobsby, F.R.S.A., whilst to Mr. H. Jarvis is due the colour portrayal.



Photo : Dept. Agriculture and Stock.]

PLATE 45.—ENTOMOLOGICAL PANEL, COURT OF THE DEPARTMENT OF AGRICULTURE AND STOCK.

Banana Weevil Borer.

Distinct from the foregoing was a special stand devoted to this insect in charge of Mr. J. L. Froggatt B.Sc., entomologist in charge of banana beetle-borer investigations. This exhibit not only showed the beetle in all stages of its life history, actual living specimens supplementing others, but illustrations of its injuries and several modes of occurrence. As, in the case of the foregoing entomological and pathological exhibits, this section was evidently fully appreciated for its immense educational value.



PLATE 46.—FIRST IN THE EQUESTRIENNE TEAMS COMPETITION.
THE BRISBANE TEAM.



PLATE 47.—ROMA TEAM, SECOND.



PLATE 48. -BEST AMATEUR LADY RIDER: MISS SUSAN SPENCER.



PLATE 49.—WINNER OF THE LADIES' HUNT: MISS WARD.



PLATE 50.—A. D. McKAY'S "JACK," CHAMPION HACK: MISS MULLEN, RIDER.



PLATE 51.—"BEN ARNOLD," SEVEN YEARS CHAMPION HACK.

The old horse, winner of many Championships at Brisbane and other Shows, died at the end of June.

DISTRICT EXHIBITS.

PRIMARY PRODUCTS AND MANUFACTURES.

The result in the award in the primary products and manufactures, or "A" grade exhibits, was a triumph for the West Moreton District, which won the coveted honour for the second year in succession with the very fine aggregate of 1,213 points out of a possible 1,558. Its only opponent—Wide Bay and Burnett—secured an aggregate of 816 points. The success of West Moreton can be better gauged from the fact that in 1921 its exhibit won with an aggregate of 1,094½, so that, notwithstanding the chief organiser's optimistic opinion that he had a 50-point better exhibit this year, he has done much better than he anticipated. It was indeed a very fine victory for those associated with the exhibit, and West Moreton will again hold the handsome Chelmsford Shield for twelve months. Wide Bay and Burnett's aggregate of 816 points was not so good as in 1921. The following detailed points, however, show the strong and weak sections of each of the two exhibits:—

	Possible Points.	West Moreton.	Wide Bay and Burnett.
(1) DAIRY PRODUCE—			
Butter, 1 box	90	88	89½
Milk, condensed, concentrated, or dried, and by-products	40	32	0
Cheese, 1 cwt.	60	50	46
Eggs, suitable for domestic use; 1 dozen of each variety	20	18	5
	210	188	140½
(2) FOODS—			
Hams and bacon	50	48	38
Rolled and smoked beef and mutton	20	20	8
Smallgoods and sausages, if smoked or preserved	10	10	8
Fish—smoked, preserved, and canned	10	7	3
Canned meats	25	25	0
Lard, tallow, and animal oils	20	20	8
All butchers' by-products, not included in any other part of scale of points	10	10	0
Honey and its by-products	20	20	19
Confectionery, factory made	10	10	6
Bread, buseuits, scones, and cakes, factory made	10	10	9
	185	180	99
(3) FRUITS, VEGETABLES, AND ROOTS—Fresh and Preserved—			
Fresh fruits—all kinds	60	39	51
Preserved fruits, jams, &c.	30	15	8
Dried fruits	20	0	6
Fresh Vegetables—all kinds, including table pumpkins, but excluding potatoes	25	20	5
Preserved and dried vegetables, pickles, sauces, &c. . . .	10	5	0
Potatoes, English and sweet	40	30	15
Roots—all kinds—and their products, arrowroot, cassava, meal, &c., samples not less than 1 lb. . . .	14	10	0
Cocoanuts, peanuts, and other nuts	6	4	2
	205	129	81
(4) GRAIN, &C.—			
Wheat	50	40	8
Flour, bran, pollard, macaroni, and meals prepared therefrom	10	0	8
Maize	50	42	28
Maizena, meals, starch, glucose, and cornflours	10	3	2
Oats, rye, rice, barley, malt, pearl barley, and their meals	30	22	2
	150	107	48

DISTRICT EXHIBITS—*continued.*

	Possible Points.	West Moreton.	Wide Bay and Burnett.
(5) MANUFACTURES AND TRADES—			
All woodwork	30	28	23
All metal and ironwork.. .. .	30	25	27
Leather and all leather work and tanning	20	12	8
Manufactured woollen and cotton fibre	30	25	0
All tinwork	10	7	9
Artificial manures	10	6	5
Brooms and brushes	10	5	7
Manufactures not otherwise enumerated	15	13	10½
	155	121	89½
(6) MINERALS AND BUILDING MATERIALS—			
Gold, silver, copper, and precious stones	25	16	14
Coal, iron, other minerals, and salt	30	21	21
Stone, bricks, cement, marble, terra cotta	20	18	8
Woods—dressed, undressed, and polished, one face to be polished, one face to be dressed, and half of it polished, back to be rough, samples of wood to measure not less than 12 x 6 x 1 inch thick	25	23	22
	100	78	65
(7) TROPICAL PRODUCTS—			
Sugar-cane	60	40	50
Sugar (raw and refined)	20	12	10
Rum, spirits, and by-products.. .. .	10	5	5
Coffee (raw and manufactured), tea, and spices	10	9	6
Cotton (raw), and by-products	30	20	15
Rubber	10	0	0
Oils (vegetable)	10	8	0
	150	94	86
(8) WINES, &C.—			
Wines	15	15	10
Aerated and mineral spa water, vinegar, and cordials	10	8	9
	25	23	19
(9) TOBACCO—			
Tobacco, cigar and pipe, in leaf	20	10	0
(10) HAY, CHAFF, &C.—			
Oaten, wheaten, lucerne, and other hay	30	22	6
Grasses and their seeds	10	8	4
Oaten, wheaten, lucerne, and other chaffs	50	35	15
Ensilage and other prepared cattle fodder	20	16	0
Sorghum and millets, in stalk	10	6	8
Commercial fibres (raw and manufactured)	10	8	4
Pumpkins and other green fodder	10	7	3
Broom millet, ready for manufacture	10	6	6
Farm seeds, including canary seed	13	10	0
	163	118	46

DISTRICT EXHIBITS—*continued.*

	Possible Points.	West Moreton.	Wide Bay and Burnett.
(11) WOOL, &c.—			
Scoured wool	40	35	39
Greasy wool	60	55	50
Mohair	10	8	10
	110	98	99
12) ENLARGED PHOTOGRAPHS—			
A maximum of 5 points will be awarded for enlarged photographs of district scenery and local raised live stock	5	3	0
(13) EFFECTIVE ARRANGEMENT—			
Comprehensiveness of view	30	24	19
Arrangement of sectional stands	15	12	8
Effective ticketing	20	14	8
General finish	15	14	8
	80	64	43
Totals	1,558	1,213	816

PRIMARY PRODUCTS ONLY.

The primary products only, or "B" Grade competition, provided an exceptionally close contest, and resulted in a win for the Pialba District with 809 points, Northern Darling Downs being runner up with 801 points, while the other three exhibits were all close up. Pialba District has gained distinction very early in its career, as this is the first occasion an exhibit has come from that district, and to defeat a strong district like the Northern Downs, which won in 1921, is no mean performance. It was unfortunate for Kingaroy to be again low down for effective arrangement, for this exhibit scored remarkably well in some of the other sections. Details are as follows:—

	Possible Points.	Gympie.	Kingaroy.	Maranoa.	Northern Darling Downs.	Pialba.
(1) DAIRY PRODUCE—						
Butter	90	88	87	85	88	80
Cheese	60	40	49	40	57	40
Eggs, for domestic use	20	12	12	10	8	16
	170	140	148	135	153	136
(2) FOODS—						
Hams, bacon, rolled, and smoked beef and mutton	50	10	25	15	30	35
Fish—smoked	10	5	2	3	3	8
Lard, tallow, and animal oils	15	7	12	10	8	10
Honey, and its by-products	25	22	11	16	15	25
Confectionery (home-made)	10	9	5	4	6	7
Biscuits, bread, cakes, and scones (home-made)	10	7	6	5	6	6
	120	60	61	53	68	91

DISTRICT EXHIBITS—*continued.*

	Possible Points.	Gympie.	Kingaroy.	Maranoa.	Northern Darling Downs.	Palba.
(3) FRUITS, VEGETABLES, AND ROOTS—						
Fresh and preserved—						
Fresh fruits—all kinds	60	50	16	25	20	53
Preserved fruit and jams, &c., prepared by farmer	20	15	14	14	14	10
Dried fruit, prepared by farmer ..	5	3	3	..	..	..
Fresh vegetables—all kinds, including table pumpkins, but excluding potatoes	25	12	8	20	15	18
Preserved and dried vegetables, pickles, sauces, &c.	10	4	8	7	6	5
Potatoes	40	16	28	18	16	25
Roots—all kinds—and their products, arrowroot, cassava meal, &c., samples not less than 1 lb. ..	10	4	3	..	2	6
Cocoanuts, peanuts, and other nuts ..	10	5	6	5	4	8
Vegetable seeds	10	5	8	5	6	7
	190	114	94	94	83	132
(4) GRAIN, &C.—						
Wheat	50	6	15	44	42	6
Flour, bran, pollard, macaroni, and meals prepared therefrom ..	10	4	4	8	8	3
Maize	50	32	44	25	25	25
Maizena, meals, starch, glucose, and cornflour	10	3	6	6	6	5
Oats, rye, rice, barley, malt, pearl barley, and their meals	30	10	25	12	12	10
	150	55	94	95	93	49
(5) WOODS—						
Woods, dressed, undressed, and polished, one face to be dressed, and half of it polished, back to be rough, samples to measure not less than 12 x 6 x 1 inch thick ..	25	22	20	16	23	20
Wattle bark	15	10	12	8	12	9
	40	32	32	24	35	29
(6) HIDES (1) AND HOME PRESERVED SKINS FOR DOMESTIC USE—						
Must be free from offensive smell ..	15	9	4	14	12	13
(7) TROPICAL PRODUCTS—						
Sugar-cane	60	16	20	..	..	45
Coffee, tea, and spices	10	4	3	..	..	6
Cotton (raw) and by-products ..	30	12	10	15	10	15
	100	72	33	25	10	66
(8) MINERALS—						
Gold, silver, copper, and precious stones	25	14	8	..	5	12
Coal, iron, and other minerals, and salt	30	15	16	9	16	23
	55	29	24	9	21	35

DISTRICT EXHIBITS—*continued.*

	Possible Points.	Gympie.	Kingaroy.	Maranoa.	Northern Darling Downs.	Plalba.
(9) TOBACCO—						
Tobacco (cigar and pipe), in leaf ..	20	5	5	10	15	4
(10) HAY, CHAFF, &c.—						
Lucerne, oaten, wheaten, and other hay	30	8	16	25	18	12
Grasses and their seeds	7	4	6	6	4	3
Oaten, wheaten, lucerne, and other chaffs	50	20	25	40	44	30
Ensilage and other prepared cattle fodder	20	12	12	15	14	10
Sorghum and millets	10	7	7	7	7	3
Commercial fibres	10	5	5	7	5	5
Pumpkins and other green fodder ..	10	6	8	8	8	6
Hemp and flax	10	5	7	4	5	3
Broom millet, ready for manufacture	10	6	4	4	6	2
Farm seeds, including canary seed ..	13	6	11	12	10	7
	170	79	101	128	121	81
(11) WOOL, &c.—						
Scoured wool	40	30	36	39	38	30
Greasy wool	60	40	54	60	58	45
Mohair	10	9	7	9	8	7
	110	79	97	108	104	82
(12) ENLARGED PHOTOGRAPHS—						
A maximum of 5 points will be awarded for enlarged photographs of district scenery and local breed live stock	5	1	2	1	3	1
(13) LADIES' WORK—						
Needlework,—knitting	25	13	21	25	18	20
Fine arts	5	2	5	3	2	3
School work, maps, writing, &c., for pupils of schools in the district..	15	4	10	2	11	..
	45	19	36	30	31	23
(14) EFFECTIVE ARRANGEMENT—						
Comprehensiveness of view	30	24	14	16	20	26
Arrangement of sectional stands ..	15	11	7	8	9	13
Effective ticketing	20	16	8	11	12	14
General finish	15	12	7	9	11	14
	80	63	36	44	52	67
Totals.. .. .	1,270	757	767	770	801	809

ONE-FARM EXHIBITS.

WON BY Mr. K. HAAG.

The one-farm exhibit competition resulted in a triumph for Mr. K. Haag, who secured an aggregate of 470 points, with Mr. V. O. Williams, 437 points, second, and Mr. S. C. Klumpp, 365 points, third. Details:—

	Possible Points.	K. Haag.	S. C. Klumpp.	V. O. Williams.
(1) DAIRY PRODUCE—				
Butter, 6 lb.	25	23	22	23
Cheese, 1 large or 2 small (home-made) . .	20	18	8	14
Eggs, suitable for domestic use, 1 dozen each variety	5	4½	5	4½
	50	45½	35	41½
(2) FOODS—				
Hams, 15 lb. ; bacon, 15 lb. (home cured) . .	20	17	15	14
Corned, smoked, and spiced beef and mutton, 10 lb.	10	8	8	8
Honey, 12 lb.	10	10	10	8
Beeswax, 6 lb.	5	5	5	2
Bread, 2 loaves ; scones, 1 dozen	5	3	4	5
Confectionery and sweets, 3 lb.	5	4	3	4
Cakes and biscuits	5	4	3	4
Lard, tallow, oils	5	4	4	4
	65	55	52	49
(3) FRUITS, VEGETABLES, AND ROOTS :				
(Fresh and Preserved)—				
Fresh fruits, all kinds	25	11	17	9
Dried fruits	10	7	6	9
Preserved fruits and jams	15	15	13	14½
Fresh vegetables	15	12	10	5
Pickles, sauces, &c.	15	14	12	13
Potatoes, not less than 28 lb. (or a collection), and roots	25	20	15	22
Table pumpkins, squashes, and marrows, 56 lb.	10	10	7	10
Cocoanuts and nuts	3	1	1	1
Vegetable and garden seeds	5	3	3	5
Arrowroot, 10 lb.	5	5	5	2
Sugar beet, 3 lb.	5	4	2	2
Cassava, 3 lb.	5	4	4	..
Ginger, 3 lb.	5	5	..	..
	143	111	95	92½
(4) GRAIN, &c.—				
Wheat	25	23	7	12
Maize	20	18	10	18
Barley, oats, rye, and rice	20	15	..	16
	65	56	17	46
(5) TROPICAL PRODUCTS—				
Sugar-cane, 24 stalks or 1 stool	30	25	25	2
Cotton, in seed, 10 lb., long staple . . .	10	8	6	5
Coffee, 10 lb.	5	..	5	3
	45	33	36	10
(6) TOBACCO—				
Tobacco leaf, dried, 5 lb.	10	..	6	5

ONE-FARM EXHIBIT—*continued.*

	Possible Points.	K. Haag.	S. C. Klumpp.	V. O. Williams.
(7) HAY, CHAFF, &C.—				
Hay, oatsen, wheaten, lucerne, and other varieties	20	18	10	20
Grasses and their seeds, including canary..	10	9	7	9
Chaff, oatsen, wheaten, lucerne, and other varieties	20	18	16	18
Ensilage, any form	15	12	10	15
Cattle fodder (pumpkins and green fodder)	15	15	10	14
Sorghum and millet	10	10	4	8
Hemp, 5 lb.	5	3	3	5
Flax, 5 lb.	5	4	3	4
Cow pea seed, 7 lb.	7	7	..	5
Brown millet, 10 lb.	10	10	10	7
	117	106	73	105
(8) WOOL—				
Greasy, 5 fleeces	20	..	..	16
Mohair.. .. .	5	5	..	4
	25	5	..	20
(9) DRINKS, &C.—				
Temperance drinks, 6 bottles	10	8	4	4
(10) WOMEN'S AND CHILDREN'S WORK—				
Needlework, knitting	10	4	6	4
Fine arts	5	2	..	3
Fancy work	15	8	12	10
School work, maps, writing, &c.	10	..	1	8
	40	14	19	25
(11) MISCELLANEOUS—				
Articles of commercial value	5	2½	2	5
(12) PLANTS AND FLOWERS—				
In pots	5	5	3½	4
(13) TIME AND LABOUR- SAVING USEFUL ARTICLES—				
Made on the farm	10	3	5	3
(14) EFFECTIVE ARRANGEMENT OF EXHIBITS—				
Comprehensiveness of view	10	9	6	8
Arrangement of stands	5	4	3	5
Effective ticketing	5	5	3	5
General finish	10	8	6	9
	30	26	18	27
Totals	620	470	365	437

BUTTER EXHIBITS.**GRANTHAM TAKES EXPORT CLASSES.**

The Queensland Farmers' Co-operative Company, Limited, at Grantham, took first prize with 95½ points, the Dalby factory of the Downs Co-operative Dairy Company Limited was second with 95 points, and the Clifton factory of the same concern third with 94½ points.

Following are the details:—

EXPORT BUTTER (30 DAYS' STORAGE).**Class 8.**

One box butter (salted), most suitable for export, to be stored thirty clear days prior to 7th August, 1922.

ONE BOX (SALTED), 30 DAYS' STORAGE.

	Flavour.	Texture.	Colour.	Salting.	Packing.	Total.
Possible points	65	20	7	4	4	100
Queensland Farmers' Co-operative Co., Ltd., Grantham	61	20	7	4	3½	95½
Downs Co-operative Dairy Co., Ltd., Dalby	60	20	7	4	4	95
Downs Co-operative Dairy Co., Ltd., Clifton	60	19½	7	4	4	94½
Queensland Farmers' Co-operative Co., Ltd., Boonah	59	20	7	4	4	94
Caboolture Co-operative Dairy Co., Ltd.	59	20	7	4	3½	93½
Gayndah Co-operative Dairy Co., Ltd.	59	20	7	4	3½	93½
Goombungee Co-operative Dairy Co., Ltd.	58	20	7	4	4	93
Maryborough Co-operative Dairy Co., Ltd., Maryborough	58	20	7	4	4	93
Maryborough Co-operative Dairy Co., Ltd., Kingaroy	59	20	6½	4	3½	93
Murrumbidgee Irrigation Dairy Farmers' Co-operative Co., Ltd.	60	20	5	4	4	93
Logan and Albert Co-operative Co., Ltd.	58	20	7	4	3½	92½
Queensland Farmers' Co-operative Co., Ltd., Laidley	58	20	7	4	3½	92½
Stanley River Co-operative Co., Ltd.	58	20	7	4	3	92
Queensland Farmers' Co-operative Co., Ltd., Booval	57	20	7	4	3½	91½
Terror's Creek and Samson Vale Co., Ltd.	58	19	7	4	3	91
Wide Bay Co-operative Dairy Co., Ltd., Gympie	58	19	7	4	3	91
Maleny Co-operative Dairy Co., Ltd.	56	20	7	4	3½	90½
Wide Bay Co-operative Dairy Co., Ltd., Cooroy	56	20	7	4	3	90
Ballina Co-operative Preserving Co., Ltd.	55	20	7	4	3½	89½
Kin Kin Co-operative Dairy Co., Ltd.	54	20	7	4	3½	88½
South Burnett Co-operative Dairy Co., Ltd.	54	20	7	4	3½	88½

BUTTER EXHIBITS—continued.

ONE BOX (UNSALTED), 8 WEEKS' STORAGE.

One box butter (unsalted), most suitable for export, to be stored eight weeks prior to 7th August.

	Flavour.	Texture.	Colour.	Packing.	Total.
Possible points	65	20	7	4	96
Downs Co-operative Dairy Co., Ltd., Dalby ..	61	20	7	4	92
Ballina Co-operative Preserving Co., Ltd. ..	61	20	7	3½	91½
Downs Co-operative Dairy Co., Ltd., Clifton ..	60	20	7	4	91
Downs Co-operative Dairy Co., Ltd., Crow's Nest	60	19½	7	4	90½
Maryborough Co-operative Dairy Co., Ltd., Kingaroy	61	20	6½	3	90½
Queensland Farmers' Co-operative Co., Ltd., Boonah	60	20	6½	4	90½
Gayndah Co-operative Dairy Co., Ltd.	59	20	7	4	90
Nanango Co-operative Dairy Co., Ltd.	60	20	6	4	90
Queensland Farmers' Co-operative Co., Ltd., Booval	60	20	6½	3½	90
Queensland Farmers' Co-operative Co., Ltd., Laidley	60	20	6½	3½	90
Caboolture Co-operative Dairy Co., Ltd.	59	20	6½	4	89½
Wide Bay Co-operative Dairy Co., Ltd., Gympie..	59	19½	7	3½	89
Oakey Co-operative Dairy Co., Ltd.	59	20	7	3½	89½
Queensland Farmers' Co-operative Co., Ltd., Grantham	60	20	6	3½	89½
Logan and Albert Co-operative Dairy Co., Ltd...	58	20	7	3½	88½
Maryborough Co-operative Dairy Co., Ltd., Mary- borough	58	20	6½	4	88½
Warwick Butter and Dairying Co., Ltd., Mill Hill	58	20	7	3½	88½
Goombungee Co-operative Dairy Co., Ltd.	57	20	7	4	88
Wide Bay Co-operative Dairy Co., Ltd., Cooroy..	58	19½	7	3½	88
Terror's Creek and Samson Vale Dairy Co., Ltd...	58	19½	6½	3	87
Maleny Co-operative Dairy Co., Ltd.	56	19½	7	4	86½
South Burnett Co-operative Dairy Co., Ltd. ..	57	20	6½	3	86½

EIGHT WEEKS' STORAGE.

Class 10.

One box butter (salted), suitable for export, to be kept in cold stores not less than eight weeks prior to 7th August.

ONE BOX (SALTED), 8 WEEKS' STORAGE.

	Flavour.	Texture.	Colour.	Salting.	Packing.	Total.
Possible points	65	20	7	4	4	100
Downs Co-operative Dairy Co., Ltd., Dalby	60	20	7	4	4	95
Warwick Butter and Dairy Co., Ltd., Allora	59	20	7	4	4	94
Stanley River Co-operative Co., Ltd.	59	20	7	4	3½	93½
Ballina Co-operative Preserving Co., Ltd. ..	58	20	7	4	4	93
Gayndah Co-operative Dairy Co., Ltd.	58	20	7	4	4	93
Logan and Albert Co-operative Dairy Co., Ltd.	58	20	7	4	4	93
Queensland Farmers' Co-operative Co., Ltd., Boonah	58	20	7	4	4	93
Queensland Farmers' Co-operative Co., Ltd., Booval	58½	20	7	4	3½	93
Queensland Farmers' Co-operative Co., Ltd., Laidley	59	20	7	4	3	93
Wide Bay Co-operative Dairy Co., Ltd., Gympie	58	20	7	4	4	93

BUTTER EXHIBITS—*continued.*ONE BOX (SALTED), 8 WEEKS' STORAGE—*continued.*

	Flavour.	Texture.	Colour.	Salting.	Packing.	Total.
Possible points	65	20	7	4	4	100
Oakey Co-operative Dairy Co., Ltd. ..	59	19	7	4	3½	92½
Queensland Farmers' Co-operative Co., Ltd., Grantham	58	20	7	4	3½	92½
Maryborough Co-operative Dairy Co., Ltd., Kingaroy	57	20	7	4	4	92
Wide Bay Co-operative Dairy Co., Ltd., Cooroy	58	19	7	4	4	92
Caboolture Co-operative Dairy Co., Ltd. ..	58	19	7	4	3½	91½
Downs Co-operative Dairy Co., Ltd., Clifton	57	20	7	4	3½	91½
Goombungee Co-operative Dairy Co., Ltd. ..	57	19½	7	4	4	91½
Nanango Co-operative Dairy Co., Ltd. ..	57	20	6½	4	4	91½
Downs Co-operative Dairy Co., Ltd., Crow's Nest	56	20	7	4	4	91
Warwick Butter and Dairying Co., Ltd., Mill Hill	57	19½	7	4	3½	91
Maleny Co-operative Dairy Co., Ltd. ..	56	19½	7	4	4	90½
Maryborough Co-operative Dairy Co., Ltd., Maryborough	56	19½	6½	4	4	90
South Burnett Co-operative Dairy Co., Ltd. ..	56	19½	7	4	3½	90
Terror's Creek and Samson Vale Dairy Co., Ltd.	57	10	7	4	3	90

FRESH BUTTER.

The following are the awards in the fresh butter classes:—

ONE BOX, FACTORY MAKE, LOCAL CONSUMPTION.

	Flavour.	Texture.	Colour.	Salting.	Packing and Finish.	Total.
Possible points	65	20	7	4	4	100
Queensland Farmers' Co-operative Dairy Co., Ltd., Grantham	61	20	7	4	4	96
Queensland Farmers' Co-operative Dairy Co., Ltd., Booval	60½	20	7	4	4	95½
Logan and Albert Co-operative Dairy Co., Ltd.	60	20	7	4	4	95
Downs Co-operative Dairy Co., Ltd., Crow's Nest	60	20	7	4	3½	94½
Queensland Farmer's Co-operative Dairy Co., Ltd., Laidley	60	19½	7	4	4	94½
South Burnett Co-operative Dairy Co., Ltd. ..	61	19½	6½	4	3½	94½
Maryborough Co-operative Dairy Co., Ltd., Kingaroy	60	20	6½	4	3½	94
Wide Bay Co-operative Dairy Co., Ltd., Gympie	61	19½	6½	3½	3½	94
Nanango Co-operative Dairy Co., Ltd. ..	60	19½	6½	4	3½	93½
Queensland Farmers' Co-operative Dairy Co., Ltd., Boonah	59½	20	7	3½	3½	93½
Seone Co-operative Dairy Co., Ltd. ..	59	20	7	4	3½	93½
Ballina Co-operative Preserving Co., Ltd. ..	59	19½	7	4	3½	93

FRESH BUTTER—*continued.*ONE BOX, FACTORY MAKE, LOCAL CONSUMPTION—*continued.*

	Flavour.	Texture.	Co'our.	Saltng.	Packing and Finish.	Total.
Possible points	65	20	7	4	4	100
Wide Bay Co-operative Dairy Co., Ltd., Cooroy	59	19½	7	4	3½	93
Kin Kin Co-operative Dairy Co., Ltd. ..	59	19½	6½	4	3½	92½
Oakey Co-operative Dairy Co., Ltd. ..	60	19	7	3½	3	92½
Stanley River Co-operative Dairy Co., Ltd.	59	19½	6½	4	3½	92½
Maryborough Co-operative Dairy Co., Ltd., Maryborough	58	19	7	4	4	92
Downs Co-operative Dairy Co., Ltd., Dalby	57	20	6½	4	4	91½
Terror's Creek and Samson Vale Dairy Co., Ltd.	59½	18½	6½	4	3	91½
Gayndah Co-operative Dairy Co., Ltd. ..	57	19½	6½	4	4	91
Goombungee Co-operative Dairy Co., Ltd.	58	19	7	4	3	91
Warwick Butter and Dairying Co., Ltd., Allora	58	19	7	3½	3½	91
Caboolture Butter and Dairying Co., Ltd., Pomona	58	19	6½	4	3½	91
Maleny Co-operative Dairy Co., Ltd. ..	57	19½	6½	4	3	90

SPECIAL AWARD FOR THE FACTORY SECURING THE GREATEST AGGREGATE NUMBER OF POINTS FOR ALL CLASSES OF BUTTER.

	30 Days' Storage.	8 Weeks' Unsalted.	8 Weeks' Salted.	Fresh Butter.	Total.
Downs Co-operative Dairy Co., Ltd., Dalby ..	95	92	95	91½	373½
Queensland Farmers' Co-operative Dairy Co., Ltd., Grantham	95½	89½	92½	96	373½
Queensland Farmers' Co-operative Dairy Co., Ltd., Boonah	94	90½	93	93½	371
Downs Co-operative Dairy Co., Ltd., Crow's Nest	94	90½	91	94½	370
Queensland Farmers' Co-operative Dairy Co., Ltd., Booval	91½	90	93	95½	370
Queensland Farmers' Co-operative Dairy Co., Ltd., Laidley	92½	90	93	94½	370
Maryborough Co-operative Co., Ltd., Kingaroy ..	93	90½	92	94	369½
Logan and Albert Co-operative Dairy Co., Ltd. ..	92½	88½	93	95	369
Gayndah Co-operative Dairy Co., Ltd.	93½	90	93	91	367½
Wide Bay Co-operative Dairy Co., Ltd., Gympie	91	89	93	94	367
Ballina Co-operative Preserving Co., Ltd. ..	89½	91½	93	93	367
Goombungee Co-operative Dairy Co., Ltd. ..	93	88	91½	91	363½
Maryborough Co-operative Dairy Co., Ltd., Mary- borough	93	88½	90	92	363½
Wide Bay Co-operative Dairy Co., Ltd., Cooroy	90	88	92	93	363
South Burnett Co-operative Dairy Co., Ltd. ..	88½	86½	90	94½	359½
Terror's Creek and Samson Vale Dairy Co., Ltd.	91	87	90	91½	359½
Maleny Co-operative Dairy Co., Ltd.	90½	86½	90½	90	357½
Stanley River Co-operative Dairy Co., Ltd. ..	92	..	93½	92½	278
Downs Co-operative Dairy Co., Ltd., Clifton ..	94½	91	91½	..	277
Nanango Co-operative Dairy Co., Ltd. .. ..	..	90	91½	93½	275
Oakey Co-operative Dairy Co., Ltd. .. ..	..	89½	92½	92½	274½
Kin Kin Co-operative Dairy Co., Ltd.	88½	..	..	92½	181
Warwick Butter and Dairying Co., Ltd., Mill Hill	..	88½	91	..	179½
The Scone Co-operative Dairy Co., Ltd. .. ..	..	..	..	93½	93½

CHEESE—EXPORT CLASSES.

The following are the awards in the export cheese classes:—

Two export cheeses, 70-80 lb. (not more than three weeks old prior to storing), white, suitable for English market:—

Possible points	Flavour.	Texture.	Colour.	Finish.	Total.
Possible points	50	25	15	10	100
Pittsworth Dairy Co., Ltd., Pittsworth	44½	25	15	10	94½
Pittsworth Dairy Co., Ltd., Factory	44	24½	15	9½	93
Goombungee Co-operative Dairy Co., Ltd. ..	42½	24½	15	9½	91½
Biddeston Co-operative Dairy Co., Ltd. ..	30	24½	14½	10	88
Maryborough Co-operative Dairy Co., Ltd., Brook-lands	38½	24½	14½	9½	87
Carlyle Cheese Factory	38	24½	14½	9½	86½
Warwick Butter and Dairying Co., Ltd., Grey Mare Downs Co-operative Dairy Co., Ltd., Hodgson's Vale	38	24	14	9½	85½
	38½	24	14	8½	85

Two export cheeses, 70-80 lb. (not more than three weeks old prior to storing); coloured, suitable for English market:—

Possible points	50	25	15	10	100
Pittsworth Co-operative Dairy Co., Ltd., Pitts- worth	45½	25	14½	10	95
Woodleigh Cheese Factory	43½	24½	15	9	92
Pittsworth Dairy Co., Ltd., Springsure	41	25	14½	10	91½
Biddeston Co-operative Dairy Co., Ltd.	42½	24½	14½	9½	91
Malling Cheese Factory	42	24½	15	9½	91
Maryborough Co-operative Dairy Co., Ltd., Brook-lands	42	24½	14½	9½	90½
Mount Tyson Farmers' Co., Ltd.	42	24½	14½	9	90
Warwick Butter and Dairying Co., Ltd., Grey Mare	41	24½	14½	9½	89½
Carlyle Cheese Factory	39	24½	14½	9½	87½
Goombungee Co-operative Dairy Co., Ltd. ..	37	24½	14½	9½	85½
Downs Co-operative Dairy Co., Ltd., Hodgson's Vale	38½	24	14	8½	85

Two medium cheeses, not exceeding 40 lb.; age, over two and under three months:—

Possible points	50	25	15	10	100
Malling Cheese Factory	44	25	15	9½	93½
Pittsworth Dairy Co., Ltd., Pittsworth	44	25	14½	9½	93
Downs Co-operative Dairy Co., Ltd., Hodgson's Vale	44	24½	14½	9½	92½
Warwick Butter and Dairying Co., Ltd., Lord John Swamp	43½	24½	14½	9½	92
Carlyle Cheese Factory	43½	24½	14½	9	91½
Goombungee Co-operative Dairy Co., Ltd. ..	42½	25	14½	9½	91½
Warwick Butter and Dairying Co., Ltd., Elbow Vale	43	24½	14½	9½	91½
Merrimac Cheese Factory	42	24½	14½	10	91
Warwick Butter and Dairying Co., Ltd., Grey Mare	42	24½	14½	9½	90½
Mount Tyson Farmers' Co-operative Dairy Co., Ltd.	41½	24½	14½	9½	90
G. W. Stanley	41	24½	14½	9½	89½
Warwick Butter and Dairying Co., Ltd., Victoria Hill	40	24½	15	9½	89
Southbrook Co-operative Dairy Co., Ltd. ..	39	24½	14½	9	87
Warwick Butter and Dairy Co., Ltd., Bony Mountain	38	24½	14½	9½	86½
Rosalie Cheese Factory	38½	24	14½	9	86

CHEESE—EXPORT CLASSES—*continued*.

Two medium cheeses, not exceeding 40 lb.; age, over six weeks and under two months :—

	Flavour.	Texture.	Colour.	Finish.	Total.
Possible points	50	25	15	10	100
Pittsworth Dairy Co., Ltd., Pittsworth	45½	25	15	9½	95
Malling Cheese Factory	44	25	15	10	94
Mount Tyson Farmers' Co-operative Dairy Co., Ltd.	44	25	14½	9½	93
Warwick Butter and Dairying Co., Ltd., Bony Mountain	44	24½	15	9	92½
Downs Co-operative Dairy Co., Ltd., Hodgson's Vale	42½	24½	14½	9½	91
Pittsworth Dairy Co., (46A)	41½	24½	15	9½	90½
Pittsworth Dairy Co. (46B)	42	24½	14½	9½	90½
Warwick Butter and Dairying Co., Ltd., Victoria Hill	42	24½	14½	9½	90½
Carlyle Cheese Factory	41	24½	14½	10	90
Goombungee Co-operative Co., Ltd.	41	25	14½	9½	90
Pittsworth Dairy Co. (46c)	41½	24½	14½	9½	90
Warwick Butter and Dairying Co., Ltd., Elbow Valley	41½	24	14½	9½	89½
Warwick Butter and Dairying Co., Ltd., Lord John Swamp	41	24	14½	9½	89
Warwick Butter and Dairying Co., Ltd., Grey Mare	40	24½	14½	9½	88½
Southbrook Co-operative Dairy Co., Ltd.	40	24	14½	9½	88

Two loaf cheeses, not exceeding 12 lb.; age, over two months and under three months :—

	50	25	15	10	100
Possible points	50	25	15	10	100
Warwick Butter and Dairying Co., Ltd., Bony Mountain	45	24½	15	9½	94
Pittsworth Dairy Co., Ltd., Pittsworth	44	25	15	9½	93½
Malling Cheese Factory	44	24½	15	9½	93
Mount Tyson Farmers' Co-operative Dairy Co., Ltd.	43	24½	14½	9½	91½
Warwick Butter and Dairying Co., Ltd., Elbow Vale	42	24½	14½	10	91
Warwick Butter and Dairying Co., Ltd., Grey Mare	42½	24½	14½	9½	91
Warwick Butter and Dairying Co., Ltd., Lord John Swamp	42½	24½	14½	9½	91
Merrimac Cheese Factory	41½	24½	14½	10	90½
Downs Co-operative Dairy Co., Ltd., Hodgson's Vale	41	24½	14½	10	90
G. W. Stanley	41½	24½	14½	9½	90
Carlyle Cheese Factory	41	24½	14½	9½	89½
Warwick Butter and Dairying Co., Ltd., Victoria Hill	40	24½	14½	9½	88½
Southbrook Co-operative Dairy Co., Ltd.	39	24½	14½	10	88
Goombungee Co-operative Dairy Co., Ltd.	38	25	14½	9½	87
Rosalie Cheese Factory	38½	24	14½	9½	86½

CHEESE—EXPORT CLASSES—*continued.*

Two loaf cheeses, not exceeding 12 lb.; age, over six weeks and under two months:—

	Flavour.	Texture.	Colour.	Finish.	Total.
Possible points	50	25	15	10	100
Pittsworth Dairy Co., Ltd., Pittsworth	44	25	15	9½	93½
Mount Tyson Farmers' Co-operative Dairy Co., Ltd.	44	24½	15	9½	93
Malling Cheese Factory	43	24½	15	10	92½
Carlyle Cheese Factory	42	24½	14½	10	91
Pittsworth Dairy Co., Ltd. (80A)	41½	24½	15	10	91
Pittsworth Dairy Co., Ltd. (80B)	42½	24½	14½	9½	91
Warwick Butter and Dairy Co., Ltd., Bony Mountain	42½	24½	14½	9½	91
Goombungee Co-operative Dairy Co., Ltd. ..	41½	24½	15	9	90
Pittsworth Dairy Co., Ltd. (80C)	41½	24½	14½	9½	90
Warwick Butter and Dairying Co., Ltd., Elbow Valley	41½	24½	14½	9½	90
Warwick Butter and Dairying Co., Ltd., Lord John Swamp	41½	24½	14½	9½	90
Downs Co-operative Dairy Co., Ltd., Hodgson's Vale	41	24½	14½	9½	89½
Southbrook Co-operative Dairy Co., Ltd. ..	40½	24	14½	9½	88½
Warwick Butter and Dairying Co., Ltd., Grey Mare	38	25	15	9½	87½
Warwick Butter and Dairying Co., Ltd., Victoria Hill	38	25	15	9½	87½
G. W. Stanley	39	24	14½	9½	87

TROPHY OF CHEESE.

	Export.	Medium.	Loaf.	T. tot.
Possible points	100	100	100	300
Downs Co-operative Dairy Co., Ltd., Hodgson's Vale ..	91	91	93	275
Carlyle Cheese Factory	89	89	86	264

HOME MILKING.**RESULT OF COMPETITIONS.**

Home-milking competitions were conducted on farms under the supervision of officers of the Department of Agriculture, the conditions being the greatest yield of butter-fat for twenty-four hours under Babcock test, milk to contain an average not less than 3.3 per cent. of butter-fat. The following are the results:—

		Milk. Lb.	Test.	Com- mercial Butter.
<i>Jerseys.</i>				
E. Burton's Oxford Buttercup IV.	N.	16	5.8	1.09
	M.	18	5.0	1.06
	N.	16½	6.7	1.30
		..	..	3.45
T. Mullen's Lady Lass III.	M.	23	5.25	1.415
	E.	23	5.25	1.415
		..	..	2.83
E. Burton's Oxford Golden Buttercup	N.	13	5.8	0.89
	M.	13½	4.4	0.695
	N.	12	5.0	0.70
		..	..	2.285
<i>Illawarra Milking Shorthorns.</i>				
R. Mears' Tulip of Morden	E.	18	5.4	1.15
	M.	24.5	3.6	1.02
	N.	21	5.5	1.36
		..	..	3.53
J. F. Cochrane's Trixie of Newholme	M.	34	3.6	1.43
	E.	29	5.6	1.91
		..	..	3.34
B. O'Connor's Fairy Queen 2nd of Glenthorne	M.	23.5	4.1	1.13
	N.	24	3.7	1.04
	E.	26	3.8	1.16
		..	..	3.33
B. O'Connor's Dahila II.	E.	21	3.9	0.96
	M.	27	3.0	0.94
	N.	24	4.3	1.20
		..	..	3.10
E. D. Lawley's Lorna of Arley	M.	27.5	4.0	1.28
	E.	28.5	5.1	1.71
		..	..	2.99
Edgar Hunt's Darling II. of Springdale	E.	15.5	5.1	0.93
	M.	16.5	3.5	0.67
		..	..	1.60

HOME MILKING—*continued.*

					—	Milk Lb.	Test.	Com- mercial Butter.
<i>Friesians.</i>								
S. H. Hosking's Margaret Anglin II.	..	..			E.	20.5	3.9	0.93
					*M.	21.5	4.2	1.05
					†M.	22.0	3.5	0.90
					N.	22.5	4.0	1.04
						..	..	3.92
P. P. Falt's Oaklea Noreen	..	..	..	..	E.	33.5	3.8	1.48
					M.	36	5.4	2.29
						..	..	1.77
P. P. Falt's Dairymaid..	..	..	..	..	E.	24	4.4	1.24
					M.	26	4.2	1.28
					N.	21.5	4.8	1.205
						..	..	3.725
Grindles Ltd. Lady Creamillo	..	..	..	..	M.	34	3.8	1.51
					E.	31	4.2	1.53
						..	..	3.04
<i>Ayrshires.</i>								
Executors late John Anderson's Jeanette R. III. of Invercauld	..	..	..	..	M.	28.5	4.0	1.32
					E.	29	4.0	1.35
					M.	31	3.9	1.41
					E.	26	4.2	1.28
						..	..	5.36
Jonas Holmes' Peggy II. of Longlands	..	..			M.	27.5	3.5	1.120
					E.	28	4.4	1.440
					M.	25	3.6	1.070
					E.	28.5	4.6	1.530
						..	..	5.16
Penal Establishment's (St. Helena) Jeannie III.	..				M.	30	3.1	1.08
					E.	26	3.8	1.16
					M.	30	4.0	1.40
					E.	28	4.1	1.35
						..	..	4.99

* Midnight.

† Morning.

MILKING TESTS.

Judges:—Messrs. R. W. Winks and L. F. Anderson. Mr. E. D. Lewley's Lorna of Arley won the National champion butter-fat test. Owing to an error the awards in two classes were not made available. Details:—

COW, 4 YEARS OLD AND OVER, AVERAGING THE GREATEST DAILY YIELD OF BUTTER FAT FOR 48 HOURS.

		Milk, Lb.	Percentage.	Commercial Butter.	Points Butter Fat 24 hours.	Lactation Points.	Total Points.
E. D. Lawley's Lorna of Arley	M.	34.8	3.8	1.530	..	..	..
	E.	30.14	5.0	1.814	..	..	..
	M.	35.10	3.8	1.575	..	..	..
	E.	31.9	4.5	1.668	..	..	..
		132.9	..	6.587	52.7	..	52.7
A. Pickel's Jean the Fifth of Blacklands	M.	27.7	4.4	1.412	..	..	..
	E.	24.6	5.6	1.603	..	..	..
	M.	26.4	4.4	1.353	..	..	..
	E.	22.14	4.6	1.234	..	..	..
		100.15	..	5.602	44.8	..	44.8
B. O'Connor's Tulip the Fourth of Hillview	M.	28.12	3.7	1.240	..	..	..
	E.	25.6	4.5	1.339	..	..	..
	M.	27.8	4.2	1.350	..	..	..
	E.	25.10	4.5	1.351	..	..	..
		107.4	..	5.280	42.2	..	42.2
B. O'Connor's Dahlia 2nd of Hillview	M.	35.8	2.9	1.185	..	..	..
	E.	32.5	3.6	1.363	..	..	..
	M.	32.12	3.5	1.330	..	..	..
	E.	33.1	3.2	1.232	..	..	..
		133.10	..	5.110	40.9	..	40.9
R. Mear's Hazel of Morden	M.	22.12	3.9	1.030	..	..	..
	E.	19.14	4.1	0.945	..	..	..
	M.	21.5	3.2	0.789	..	..	..
	E.	20.14	4.1	0.995	..	..	..
		84.13	..	3.732	29.9	10	39.9
J. F. Cochrane's Trixie of Newholme	M.	29.4	3.3	1.128	..	..	..
	E.	27.8	4.0	1.280	..	..	..
	M.	30.0	3.5	1.220	..	..	..
	E.	28.10	4.0	1.325	..	..	..
		115.6	..	4.953	39.6	..	39.6
R. Mear's Tulip of Morden	M.	27.1	2.5	0.786	..	..	..
	E.	26.6	4.4	1.359	..	..	..
	M.	26.4	3.0	0.907	..	..	..
	E.	29.0	4.4	1.490	..	..	..
		108.11	..	4.542	39.3	..	36.3

MILKING TESTS—*continued.*Cow, 4 YEARS OLD AND OVER, AVERAGING THE GREATEST DAILY YIELD OF BUTTER FAT FOR 48 HOURS—*continued.*

—	—	Milk, Lb.	Percentage.	Commercial Butter.	Points Butter Fat 24 hours.	Lactation Points.	Total Points.
A. J. Caswell's Floss of Dalwon	M.	29.8	2.8	0.955	..	..	..
	E.	26.13	3.2	0.995	..	..	..
	M.	29.12	3.3	1.143	..	..	..
	E.	27.14	3.7	1.305	..	..	..
		113.15	..	4.298	34.4	..	34.4
E. Burton's Oxford Golden Buttercup	M.	19.14	4.4	1.024	..	..	..
	E.	18.5	5.3	1.139	..	..	..
	M.	19.11	4.5	1.044	..	..	..
	E.	18.6	5.0	1.079	..	..	..
		76.4	..	4.286	34.3	..	34.3
W. F. Hammel's Ginger	M.	23.14	3.7	1.025	..	..	..
	E.	20.9	3.8	0.913	..	..	..
	M.	20.10	3.4	0.809	..	..	..
	E.	18.8	4.6	0.995	..	..	..
		83.9	..	3.742	29.9	..	29.9
J. William's Lizzie of Woodbine	M.	21.2	3.0	0.734	..	..	..
	E.	19.4	3.6	0.880	..	..	..
	M.	20.10	2.6	0.623	..	..	..
	E.	22.1	4.3	1.103	..	..	..
		83.1	..	3.260	26.1	2.2	28.3

Cow, 4 YEARS OLD AND OVER, AVERAGING THE GREATEST YIELD OF BUTTER FAT FOR 48 HOURS.

—	—	Milk, Lb.	Percentage.	Commercial Butter.
E. D. Lawley's Lorna of Arley	M.	34.8	3.8	1.530
	E.	30.14	5.0	1.814
	M.	35.10	3.8	1.575
	E.	31.9	4.5	1.668
		132.9	..	6.587
A. Pickel's Jean the Fifth of Blacklands	M.	27.7	4.4	1.412
	E.	24.6	5.6	1.603
	M.	26.4	4.4	1.353
	E.	22.14	4.6	1.234
		100.15	..	5.602
B. O'Connor's Tulip the Fourth of Hillview.. ..	M.	28.12	3.7	1.240
	E.	25.6	4.5	1.339
	M.	27.8	4.2	1.350
	E.	25.10	4.5	1.351
		107.4	..	5.280

MILKING TESTS—*continued.*COW, 4 YEARS AND OVER, AVERAGING THE GREATEST YIELD OF BUTTER FAT FOR 48 HOURS—*continued.*

					—	Milk, Lb.	Percent- tage.	Com- mercial Butter.
B. O'Connor's Dahlia 2nd of Hillview	..	..	..	..	M.	35.8	2.9	1.185
					E.	32.5	3.6	1.363
					M.	32.12	3.5	1.330
					E.	33.1	3.2	1.232
						133.10	..	5.110
J. F. Cochrane's Trixie of Newholme	..	..	..	..	M.	29.4	3.3	1.128
					E.	27.8	4.0	1.280
					M.	30.0	3.5	1.220
					E.	28.10	4.0	1.325
						115.6	..	4.953
R. Mears' Tulip of Morden	..	..	..	..	M.	27.1	2.5	0.786
					E.	26.6	4.4	1.359
					M.	26.4	3.0	0.907
					E.	29.0	4.4	1.490
						108.11	..	4.542
A. J. Caswell's Floss of Dnalwon	..	..	..	..	M.	29.8	2.8	0.955
					E.	26.13	3.2	0.995
					M.	29.12	3.3	1.143
					E.	27.14	3.7	1.205
						113.15	..	4.298
W. F. Hammel's Ginger	..	..	..	..	M.	23.14	3.7	1.025
					E.	20.9	3.8	0.913
					M.	20.10	3.4	0.809
					E.	18.8	4.6	0.995
						83.9	..	3.742
E. Burton's Oxford Golden Girl	..	..	..	..	M.	21.12	3.4	0.859
					E.	20.4	3.8	0.900
					M.	19.10	3.8	0.875
					E.	19.2	4.3	0.956
						80.12	..	3.590
J. William's Lizzie Woodbine	..	..	..	..	M.	21.2	3.4	0.734
					E.	19.4	3.6	0.800
					M.	20.10	2.6	0.623
					E.	22.1	4.3	1.103
						83.1	..	3.260

MILKING TESTS—*continued*.

SPECIAL PRIZE, 4 YEARS OLD AND OVER, AVERAGING THE GREATEST DAILY YIELD OF BUTTER FAT FOR 48 HOURS.

—	—	Milk, Lb.	Per- centage.	Com- mercial Butter.
E. D. Lawley's Lorna of Arley	M.	34.8	3.8	1.53
	E.	30.14	5.0	1.814
	M.	35.10	3.4	1.575
	E.	31.9	4.5	1.668
		132.9	..	6.587
A. Pickel's Jean the Fifth of Blacklands	M.	27.7	4.4	1.412
	E.	24.6	5.6	1.603
	M.	26.4	4.1	1.353
	E.	22.14	4.6	1.234
		100.15	..	5.602
B. O'Connor's Tulip Fourth of Hillview	M.	18.12	3.7	1.240
	E.	25.6	4.5	1.339
	M.	27.8	4.2	1.350
	E.	25.10	4.5	1.351
		107.4	..	5.280

ROYAL NATIONAL CHAMPION BUTTER-FAT TEST.

Cow, any breeding, averaging the greatest yield of butter-fat for forty-eight hours under the Babcock test, and which has been the property of the exhibitor three months before the entry.

£25 special prize, and a cash prize of £2 2s. yearly to the winner, presented by Brisbane Newspaper Company.

—	—	Milk, Lb.	Per- centage.	Com- mercial Butter.	Points for Butter 24 Hours.	Lactation Points.	Total Points.
E. D. Lawley's Lorna of Arley	M.	34.8	3.8	1.530	..	..	..
	E.	30.14	5.0	1.814	..	..	..
	M.	35.10	3.8	1.575	..	..	..
	E.	31.9	4.5	1.668	..	..	..
Total .. .. .	..	132.19	..	6.587	52.7	..	52.7

NOTE.—The above was the only one given in the official book.

MILKING TESTS—*continued*

The following additional milking test awards were made available on 9th August:—

COW OR HEIFER, UNDER 4 YEARS, AVERAGING THE GREATEST DAILY YIELD OF BUTTER FAT FOR 48 HOURS.

				Weight of Milk.	Per- centage.	Com- mercial Butter.
A. J. Caswell's Rosie IV. of Greyleigh	..	..	M.	28.8	3.5	1.160
			E.	22.8	4.2	1.100
			M.	22.10	4.5	1.201
			E.	21.2	4.3	1.056
				94.12	..	4.517
E. Burton's Oxford Golden Buttermcup	..	..	M.	19.14	4.4	1.024
			E.	18.5	5.3	1.139
			M.	19.11	4.5	1.044
			E.	18.6	5.0	1.079
				76.4	..	4.286
W. Spresser's Carnation Lucy	..	..	M.	19.4	3.6	0.800
			E.	18.8	5.3	1.150
			M.	19.0	5.0	1.120
			E.	18.12	5.2	1.145
				75.8	..	4.215
P. Moore's Clover V. of Sunnyside	..	..	M.	25.8	3.8	1.130
			E.	22.8	3.8	1.000
			M.	24.0	3.2	0.890
			E.	22.13	4.1	1.093
				94.13	..	4.113
C. Behrendorff's Fanny of Inavale	..	..	M.	22.14	3.2	1.015
			E.	22.3	3.7	0.958
			M.	24.10	3.5	1.005
			E.	22.0	4.0	1.020
				91.11	..	3.998
Macfarlane Bros.' Viola XXVI. of Darbalara	..	..	M.	23.2	2.9	0.774
			E.	22.2	3.8	0.985
			M.	22.9	3.5	0.924
			E.	21.8	3.6	0.900
				89.5	..	3.583
R. E. Freeman's Vercsdale Ruby	..	..	M.	19.1	4.0	0.883
			E.	18.14	4.7	1.034
			M.	18.10	2.7	0.579
			E.	20.1	4.1	0.962
				76.10	..	3.458

MILKING TESTS—*continued.*COW OR HEIFER, UNDER 4 YEARS, AVERAGING THE GREATEST DAILY YIELD OF BUTTER FAT FOR 48 HOURS—*continued.*

		Weight of Milk.	Per- centage.	Com- mercial Butter.
A. Pickel's Pearl II. of Blacklands	M.	19.7	3.3	0.743
	E.	18.2	4.6	0.976
	M.	21.8	3.4	0.845
	E.	18.1	3.9	0.823
		77.2	..	3.387
Macfarlane Bros.' Handsome II. of Kilbirnie ..	M.	22.14	2.7	0.707
	E.	22.12	3.2	0.833
	M.	23.4	3.2	0.857
	E.	23.0	3.2	0.850
		91.14	..	3.247
F. G. Brown's Maud Rooker Korndyke	M.	23.2	2.0	0.538
	E.	24.0	3.0	0.849
	M.	22.3	3.2	0.816
	E.	17.8	4.0	0.810
		87.7	..	3.013
G. Isles' Lily II. of Eldo	M.	16.15	3.1	0.600
	E.	14.13	3.8	0.653
	M.	15.6	3.8	0.685
	E.	14.2	3.8	0.625
		61.4	..	2.563

COW OR HEIFER, UNDER 4 YEARS, AVERAGING THE GREATEST DAILY YIELD OF BUTTER FAT FOR 48 HOURS.

		Weight of Milk.	Per- centage.	Com- mercial Butter.	Points Butter Fat, 24 Hours.	Lactation Points.	Total Points.
A. J. Caswell's Rose the Fourth of Greyleigh	M.	28.8	3.5	1.160	..	..	..
	E.	22.8	4.2	1.100	..	..	..
	M.	22.0	4.5	1.201	..	..	..
	E.	21.2	4.3	1.056	..	..	..
		94.12	..	4.517	36.1	..	36.1
E. Burton's Oxford Golden Buttercup	M.	19.14	4.4	1.024	..	..	..
	E.	18.5	5.3	1.139	..	..	..
	M.	19.11	4.5	1.044	..	..	..
	E.	18.6	5.0	1.079	..	..	..
		76.4	..	4.286	34.3	..	34.3
W. Spresser's Carnation Lucy	M.	19.4	3.6	0.800	..	..	..
	E.	18.8	5.3	1.150	..	..	..
	M.	19.0	5.0	1.120	..	..	..
	E.	18.12	5.2	1.145	..	..	..
		75.8	..	4.215	33.7	..	33.7

MILKING TESTS—*continued.*COW OR HEIFER, UNDER 4 YEARS, AVERAGING THE GREATEST DAILY YIELD OF BUTTER FAT FOR 48 HOURS—*continued.*

		Weight of Milk.	Per-centage.	Com-mercial Butter.	Points Butter Fat 24 hours.	Lactation Points.	Total Points.
P. Moore's Clover the Fifth of Sunnyside	M.	25.8	3.8	1.130	..	..	..
	E.	22.8	3.8	1.000	..	..	..
	M.	24.0	3.2	0.890	..	..	..
	E.	22.13	4.1	1.093	..	..	..
		94.13	..	4.113	32.9	..	32.9
C. Behrendorff's Fanny of Inavale	M.	22.14	3.8	1.015	..	..	..
	E.	22.3	3.7	0.958	..	..	..
	M.	24.10	3.5	1.005	..	..	..
	E.	22.0	4.0	1.020	..	..	..
		91.11	..	3.998	32.0	..	32.0
Macfarlane Bros.' Viola the Twenty-sixth of Darbalara	M.	23.2	2.9	0.774	..	..	..
	E.	22.2	3.8	0.985	..	..	..
	M.	22.9	3.5	0.924	..	..	..
	E.	21.8	3.6	0.900	..	..	..
		89.5	..	3.583	28.7	..	28.7
M. Lawrence's Model the Second of City View	M.	16.12	3.4	0.659	..	..	..
	E.	14.6	3.5	0.585	..	..	..
	M.	16.8	3.5	0.670	..	..	..
	E.	14.8	3.9	0.660	..	..	..
		62.2	..	2.574	20.6	7.5	28.1
R. E. Freeman's Veresdale Ruby	M.	19.1	4.0	0.883	..	..	..
	E.	18.14	4.7	1.034	..	..	..
	M.	18.10	2.7	0.579	..	..	..
	E.	20.1	4.1	0.962	..	..	..
		76.10	..	3.458	27.7	..	27.7
A. Pickel's Pearl Third of Blacklands	M.	19.7	3.3	0.743	..	..	..
	E.	18.2	4.6	0.976	..	..	..
	M.	21.8	3.4	0.845	..	..	..
	E.	18.1	3.9	0.823	..	..	..
		77.2	..	3.387	27.1	..	27.1
Macfarlane Bros.' Handsome the Second of Kilbirnie	M.	22.14	2.7	0.707	..	..	..
	E.	22.12	3.2	0.833	..	..	..
	M.	23.4	3.2	0.857	..	..	..
	E.	23.0	3.2	0.850	..	..	..
		91.14	..	3.247	26.0	..	26.0
G. Isles' Lily the Second of Eldo	M.	16.15	3.1	0.600	..	..	..
	E.	14.13	3.8	0.653	..	..	..
	M.	15.6	3.8	0.685	..	..	..
	E.	14.2	3.8	0.625	..	..	..
		61.4	..	2.563	20.5	..	20.5

BACON, HAMS, AND LARD.

The following are the awards for bacon, hams, and lard:—

	Flavour.	Texture.	Proportion of Fat and Lean.	Butchering.	Smoking.	Colour.	Total.
BACON, SIX SIDES, FACTORY CURED.							
Possible points	45	10	10	10	10	15	100
J. C. Hutton Propty., Ltd., Brisbane	42	8	9	8	8½	13	88½
Queensland Co-operative Bacon Co., Ltd.	43	8	8½	8	8	12½	88
J. C. Hutton Propty., Ltd., Brisbane	41½	7	8	7½	8½	12	84½
Queensland Co-operative Bacon Co., Ltd.	41	8½	7½	8½	8	11	84½
J. C. Hutton Propty., Ltd., Canterbury, N.S.W.	40½	6	7	7	7½	10½	78½

HAMS, SIX, FACTORY CURED.

J. C. Hutton Propty., Ltd., Canterbury, N.S.W.	42	9	9	8	8	13	89
J. C. Hutton Propty., Ltd., Brisbane	42½	9	8	8	8½	12½	88½
Queensland Co-operative Bacon Co., Ltd.	41½	8½	8	8½	9	12½	88
Queensland Co-operative Bacon Co., Ltd.	42	8½	7½	8½	9	9	87½
J. C. Hutton Propty., Ltd., Brisbane	42½	7½	7½	8	8	12	85½

LARD IN BLADDERS.

	Flavour.	Texture.	Colour.	Finish and Appearance.	Total.
Possible points	40	25	25	10	100
J. C. Hutton Propty., Ltd., Brisbane	35	23	24	9	91
J. C. Hutton Propty., Ltd., Brisbane	34	23	24	9	90
Queensland Co-operative Bacon Co., Ltd.	32	21	22	8½	83½
Queensland Co-operative Bacon Co., Ltd.	32	21	22	8	83

SAUSAGES, SMOKED, 14 LB.

Queensland Co-operative Bacon Co., Ltd., 1.
J. C. Hutton Propty., Ltd., Brisbane, 2.

YOUNG JUDGES' COMPETITION.

There was keen rivalry in the young judges' competition, which is open to students of agricultural colleges, young farmers, farmers' sons, and others twenty-five years of age and under. Competition took place in four classes—Clydesdale stallions, beef cattle, dairy cattle (Illawarra Milking Shorthorns and Jerseys), and swine. Details:—

Dairy Cattle.—Illawarra Milking Shorthorns: H. Gordon, Lawnton, 1; A. J. Brown, Moorcombin, Toogoolawah, 2; J. H. Bassett, Mullumbimby, 3. Jerseys: O. W. Sprenger, Brassall P.O., Ipswich, 1; R. M. Anderson, Fairview, Southbrook, 2; W. Carr, junr., Indooroopilly, 3.

Swine.—Berkshires: J. H. Bassett, Mullumbimby, 1; H. P. Whittaker, Victoria Park, Southbrook, 2; H. Gordon, Lawnton, and J. B. Warburton, Northgate Junction, 3.

HORSES.

THOROUGHBREDS.

Judge, Mr. H. J. Gidney.

Stallions, 4 years and over, best adapted for improved racing stock: T. Jennings's Amberdown, 1; E. Bagley's Soldier's March, 2; State Stations Department's Paddington, 3. Four years and over, most suitable for getting horses for military purposes: W. H. Mayes's Hopoast, 1; E. Bagley's Soldier's March, 2.

Mares, 4 years and over: J. E. Shailer's Bonnie Syce, 1; J. T. Jackson's Miss Warroo, 2. Remount mares, best suited for producing remounts, hacks, hunters, &c.: Mrs. D. Fraser's Elsinora, 1; R. J. Andrews's Myrtle Pride, 2.

Champion stallion: T. Jennings's Amberdown. Reserve champion: E. Bagley's Soldier's March. The yellow ribbon went to Paddington (imp.), bred in England in 1903, and got by Martagon from Padua. Paddington was exhibited by the State Stations Department.

STUD TROTTERS AND PACERS.

Judge, Mr. W. J. Armstrong.

Stud book stallions, 6 years and over: J. Rice's Rex Wilkes, 1; M. W. Doyle's Sparkling Bells, 2. Stallion, 5 years and over: A. G. Hunter's Globe Derby, 1; R. Cocks's King Bells, 2. Colt, 2 years: J. Rice's Billie Wilkes, 1. Mare, 5 years and over: S. C. Reeves's Black Ribbons, 1; J. Rice's Ella Wilkes, 2. Mare, 4 years: J. Rice's Biddy Wilkes. Filly, 3 years: D. Knox's Winn Ella, 1; S. E. Green's Roma's Pride, 2. Family group, sire and two of his progeny: J. Rice's Rex Wilkes and progeny, 1.

Champion trotting stallion: A. G. Hunter's Globe Derby.

Reserve champion: J. Rice's Rex Wilkes.

Champion trotting mare: S. C. Reeves's Black Ribbons.

Reserve champion: J. Rice's Biddy Wilkes.

HEAVY DRAUGHT HORSES.

Judge, Mr. R. Tait.

CLYDESDALES.

Stallion, 5 years and over: J. Kilvington's Pride O'Glenore, 1; C. J. Ryman's Donald's Perfection, 2. Stallion, 4 years: J. W. McAllister's Prince Invernay, 1. Stallion, 3 years: Queensland Agricultural College's Prospector, 1; G. Elliott's Baron Windermere, 2. Colt, 1 year: J. H. Kilvington's Robin, 1. Mare, 5 years and over: G. Elliott's Lady Cellus, 1; R. Jackson, Ltd., Girlie, 2. Mare, 4 years: A. T. Creswick's Nellie, 1; A. T. Creswick's Lady Jane, 2; J. Hamilton's Heather Belle, 3. Brood mare: J. H. Kilvington's Myrtle, 1; J. H. Kilvington's Maidenbair, 2. Filly, 3 years: A. T. Creswick's Lady Windermere, 1. Filly, 2 years: G. Elliott's Lady Rangatira, 1; J. H. Kilvington's Madge, 2. Filly, 1 year: J. H. Kilvington's Star, 1. Family group, sire and two of his progeny: J. H. Kilvington's Pride O'Glenore (sire), Madge and Star.

SHIRES.

Judge, Mr. R. Tait.

Stallion, 3 years and over: J. Earnart's Hermitage, 1.

Champion draught stallion: J. H. Kilvington's Pride O'Glenore.

Reserve champion: Queensland Agricultural College's Prospector.

Champion draught mare: A. T. Creswick's Nellie.

Reserve champion: A. T. Creswick's Lady Jane.

MULES.

Light mule, any age: R. Jackson, Ltd., Digger's Donk, 1.

COBS.

Judge, Mr. L. P. Dutton.

Stallion, any age, not exceeding 15 hands: W. Wildermuth's Wildermere Meteor,

1. Mare, any age, not exceeding 15 hands: Miss E. O. Drury's Banshee, 1.

Champion cob stallion: W. Wildermuth's Wildermere Meteor.

Champion cob mare: Miss E. O. Drury's Banshee.

STUD PONIES.

Judge, Mr. L. P. Dutton.

Pony stallions best adapted for getting harness ponies. Stallion, any age, not exceeding 14 hands, to be driven in harness: H. A. Strong's Excel II., 1; T. Simpson's The Welshman, 2. Stallion, any age, to be led, not exceeding 14 hands: A. T. Noyes's Young Gaffer, 1. Stallion, any age, not exceeding 13 hands: H. A. Strong's Excel II., 1; G. E. Jackson's Little Harold, 2. Stallion any age, not exceeding 12 hands: C. J. Hobbs's Don, 1; E. J. Harris's Comet, 2.

Champion pony stallion, best adapted for getting harness ponies: C. J. Hobbs's Don.

Reserve champion: H. A. Strong's Excel II.

Pony stallions best adapted for getting saddle ponies. Stallion, any age, not exceeding 14 hands: E. Pocock's Ludo, 1; S. A. Whiting's Merry King, 2. Stallion, any age, not exceeding 13 hands: E. Pocock's Ludo, 1; S. A. Whiting's Merry King, 2. Stallion, any age, not exceeding 12 hands: Mrs. E. T. Thomson's Bonny Boy, 1.

Champion pony stallion best adapted for getting saddle ponies: E. Pocock's Ludo.

Reserve champion: S. A. Whiting's Merry King.

Welsh ponies, stallion, any age, not exceeding 14 hands: T. Simpson's The Welshman, 1; A. T. Noyes's Young Gaffer, 2.

Pony mares, brood mare, any age, not exceeding 14 hands: L. Dobson's Llew Lass, 1; C. J. Biddle's Wilston Belle, 2; highly commended, W. Farley's Dinah. Brood mare, any age, not exceeding 13 hands: R. C. Fagg's Girlie, 1; J. Mullen's Gold Top, 2; highly commended, A. E. Johnston's Peace. Brood mare, any age, not exceeding 12 hands: A. T. Noyes's Banglet, 1; Mrs. D. J. Stewart's Midge, 2; highly commended, E. B. Hughes's Bessie.

Champion pony mare: R. C. Fagg's Girlie. Reserve champion: A. T. Noyes's Banglet.

CATTLE.

HEREFORDS.

Judge, Mr. J. A. Beattie.

Hereford bull, 4 years and over: J. Sparkes's Mansel Liberator, 1; J. T. Turner's Holmwood Baron, 2. 3 and under 4 years: J. Sparkes's Mansel Banner Prince, 1; E. C. McConnell's Red Rupert, 2; J. T. Turner's Lord Chancellor, 3. 2 and under 3 years: J. Sparkes's Lyndley Monarch 1st, 1; J. H. S. Barnes's Broadwood Chance, 2; E. C. McConnell's Cressbrook Merry Boy, 3. 18 months and under 2 years: C. H. Tindal's Ramornie Commodore, 1; J. Sparkes's Admirer, 2; J. H. S. Barnes's King Broadwood, 3; E. C. McConnell's Cressbrook Premier, very highly commended;

J. Sparkes's Lyndley Baronet, highly commended. 12 months and under 18 months: J. Sparkes's Lyndley Royal, 1; J. Sparkes's Lord Lyndley 5th, 2; Tindal and Sons' Gunyan Magnitude 10th, 3. Bull calf, 6 and under 12 months: J. Sparkes's Lyndley Chief, 1; E. R. Reynolds's Sunrise, 2; F. Maxwell's Banner Prince, 3; F. Maxwell's Major Lad, very highly commended. Pair of bulls, 1 and under 2 years: J. Sparkes, 1. Group of three bulls: J. Sparkes, 1; J. H. S. Barnes, 2.

Champion Hereford bull: J. Sparkes's Mansel Liberator. Reserve champion bull: J. Sparkes's Mansel Banner Prince.

Cow, 4 years and over: J. Sparkes's Jessie Lyndley, 1; J. H. S. Barnes's Queen Flower 3rd, 2. 3 and under 4 years: J. H. S. Barnes's Miss Beattie 2nd, 1; J. Sparkes's Allie Lyndley, 2. Cow, with calf at foot: J. H. S. Barnes's Queen Flower 3rd, 1; J. Sparkes's Jessie Lyndley, 2. Cow, with two or more of her progeny: J. H. S. Barnes's Queen Flower III., 1. Cow or heifer, 2 and under 3 years: J. Sparkes's Jessie Lyndley 15th, 1; E. C. McConnell's Cressbrook Bernice, 2; E. C. McConnell's Lady President 8th, 3. Heifer, 18 months and under 2 years, J. Sparkes's Lady Lyndley 33rd, 1; J. Sparkes's Lyndley Minerva 18th, 2; E. C. McConnell's Lady President 13th, 3. Heifer 12 and under 18 months: J. H. S. Barnes's Canning Chance, 1; J. Sparkes's Lyndley Minerva 19th, 2. Heifer calf, 6 and under 12 months: J. H. S. Barnes's Flower Queen, 1; J. Sparkes's Lyndley Baroness, 2; E. C. McConnell's Cressbrook Pallia 10th, 3. Pair of heifers, 1 and under 2 years: J. Sparkes, 1. Group of three heifers: J. Sparkes, 1.

Champion Hereford cow: J. H. S. Barnes's Miss Beattie 2nd. Reserve champion cow: J. Sparkes's Jessie Lyndley.

Group.—Sire and three of his progeny: J. H. S. Barnes, 1. Breeder's group (2 males and 3 females): J. H. S. Barnes, 1; J. Sparkes, 2. Exhibitor's group (2 males and 3 females), open: J. Sparkes, 1; J. H. S. Barnes, 2. Sires' progeny stakes group, 3 animals, one sire's progeny: J. H. S. Barnes, 1; J. Sparkes, 2.

SHORTHORNS.

Judge, Donald Munro, Esq.

Bull, 4 years and over: J. Burgess's Adeote Butterfly Beau, 1; A. E. Slade's Warspite, 2. Bull, 3 years and under 4 years: Lord Bros.' Clifton Cherry Colonel, 1. Bull, 2 years and under 3 years: A. R. Lomax's Yandilla Grand Duke 47th, 1; C. E. McDougall's Lyndhurst Royal Peer 27th, 2. Bull, 18 months and under 2 years: J. S. Thonemann's Kuyara Duke of Derrimut 7th, 1; R. R. Dangar's Mooki Wild Eves Duke 2nd, 2. Bull, 12 months and under 18 months: C. E. McDougall's Lyndhurst Royal Peer 35th, 1; J. Burgess's Fairy King, 2. Bull calf, 6 months and under 12 months: J. Burgess's Fairy Knight 4th, 1; John Macgregor's Dalmore Favourite, 2; C. E. McDougall's Lyndhurst Wexham Heir I., 3; highly commended, John Macgregor's Dalmore Lord Matchem, J. S. Thonemann's Kuyara Prince 3rd, and J. S. Thonemann's Kuyara Duke of Derrimut 10th. Group of three bulls, 12 months and under 3 years: C. E. McDougall's exhibit.

Champion Shorthorn bull of Queensland: J. S. Thonemann's Kuyara Duke of Derrimut 7th. Reserve champion: J. Burgess's Adeote Butterfly Beau.

Shorthorn cow, 4 years and over: Lord Bros.' Yandilla Grand Duchess 8th, 1; J. Burgess's Princess Royal, 2; C. E. McDougall's Lyndhurst Princess Imperial 2nd, 3. Cow, 3 years and over 4 years: C. E. McDougall's Lyndhurst Royal Rose, 1. Cow, with calf at foot: J. Burgess's Princess Royal and progeny, 1; C. E. McDougall's Lyndhurst Princess Imperial 2nd and progeny, 2. Cow and two or more of her progeny: J. Burgess's Princess Royal and progeny, 1; C. E. McDougall's Lyndhurst Princess Imperial 2nd and progeny, 2. Cow or heifer, 2 years and under 3 years: C. E. McDougall's Lyndhurst Duchess of Ettrick, 1; C. E. McDougall's Lyndhurst Duke of York 2nd, 2. Heifer, 18 months and under 2 years: J. S. Thonemann's Kuyara Duchess of Derrimut 10th, 1; A. J. Cotton's Brooklyn Pansy, 2. Heifer, 12 months and under 18 months: C. E. McDougall's Lyndhurst Royal Rose 2nd, 1; Lord Bros.' Victoria Downs Duchess of Morven, 2. Heifer calf, 6 months and under 12 months: J. S. Thonemann's Kuyara Princess 2nd, 1; C. E. McDougall's Lyndhurst Lily of Gurley 2nd, 2. Group of three heifers, 12 months and under 3 years: C. E. McDougall's exhibit, 1.

Champion Shorthorn cow of Queensland: C. E. McDougall's Lyndhurst Royal Rose. Reserve champion: J. S. Thonemann's Kuyara Duchess of Derrimut 10th.

Breeder's group, 2 males and 3 females, 12 months and over: C. E. McDougall's exhibit. Exhibitor's group, 2 males and 3 females, 12 months and over, open: C. E. McDougall's exhibit, 1; J. Burgess's exhibit, 2. Sires' progeny stakes group: John Macgregor's exhibit, 1; C. E. McDougall's exhibit, 2.

STUD BEEF HERDS.**DEVONS.**

Judge, Mr. T. McIlwraith Taylor.

Bull, 3 years and over: R. A. Howell's Field Marshal 16th, 1. 2 and under 3 years: R. A. Howell's Forester's Gold Dust, 1; R. A. Howell's Field Marshal 39th, 2; R. A. Howell's Field Marshal 40th, 3. Bull, 1 and under 2 years: R. A. Howell's Field Marshal 47th, 1. Heifer, 2 and under 3 years: R. A. Howell's Lusty, 1. Cow, 3 years and over: R. A. Howell's Lusty 17th, 1.

Champion bull: R. A. Howell's Forester's Gold Dust. Reserve champion bull: R. A. Howell's Field Marshal 16th. Champion cow: R. A. Howell's Lusty 17th. Reserve champion cow: R. A. Howell's Lusty 37th.

SOUTH DEVONS.

Cow or heifer: C. Brumpton's Gentle Honesty, 1.

SUSSEX.

Bull, under 3 years: J. T. Turnor's Holmwood Ironduke, 1. Bull calf, 6 and under 12 months: J. T. Turnor's Earl Rufus, 1. Cow, 3 years and over: J. T. Turnor's Oakover Twin 5th, 1. Heifer calf, 6 and under 12 months: J. T. Turnor's Holmwood Twin.

Champion Sussex cow: J. T. Turnor's Oakover Twin.

ABERDEEN-ANGUS.

Bull, 3 years and over: G. C. Clark's Tom Thumb, 1. 1 and under 2 years: G. C. Clark's Black Jupiter, 1; G. C. Clark's Scottish Peer, 2.

Champion Aberdeen-Angus bull: G. C. Clark's Tom Thumb. Reserve champion bull: G. C. Clark's Black Jupiter.

Cow, 3 years and over: G. C. Clark's Scotswoman.

Heifer, 1 and under 2 years: G. C. Clark's Fairy Princess. 6 and under 12 months: G. C. Clark's Raffia.

Champion Aberdeen-Angus cow: G. C. Clark's Scotswoman.

RED POLLED.

Bull, 3 years and over: E. J. McConnel's Royal Farmer, 1 and champion.

DAIRY CATTLE.**AYRSHIRES.**

Judge, Mr. R. Brisbane.

Cow, 5 years and over, in milk: J. Holmes's Bell of Longlands, 1; J. Holmes's Thelma of Longlands, 2; Executors, late J. Anderson, Jeanette R 3rd of Invercauld, 3. 4 and under 5 years, in milk: J. H. Fairfax's Gem of Marinya, 1; J. Holmes's Blanche of Longlands, 2; G. Bell's Thelma 3rd of Longlands, 3. 3 and under 4 years, in milk: J. Holmes's Blonde of Longlands, 1; J. Holmes's Rosella of Longlands, 2; P. Bell's Iona of Nudgee, 3. Heifer, 2 and under 3 years, in milk: J. Holmes's Tidy 2nd of Longlands, 1; J. H. Fairfax's Fantasy of Marinya, 2; J. C. Mann's Beryl's Pride of Crescent Farm, 3. 1 and under 2 years, in milk: J. C. Mann's Beryl's Gem of Crescent Farm. Cow, 4 years and over, in calf 6 months or dry: P. Bell's Beauty 3rd of St. Helena, 1; P. Bell's Agnes of Fairfield, 2; J. C. Mann's Viola of Glenmore, 3; J. Holmes's Rosalind 2nd of Longlands, 4. 3 and under 4 years: F. A. Stimpson's Dairymead of Fairfield, 1; Carr Bros.' College Annette, 2. Heifer, 2 and under 3 years, in calf or dry: F. A. Stimpson's Catherine of Fairfield, 1; H. T. Horne's Mayflower of Thorpe Garth, 2; F. A. Stimpson's Aggie Acme of Fairfield, 3. 1 and under 2 years, dry: F. A. Stimpson's St. Helena Melba, 1; J. Holmes's Pearl of Longlands, 2; R. J. and J. Harding's Rosaleen of Wetton, 3. Heifer calf, 6 and under 12 months: J. Holmes's Pearl 2nd of Longlands, 1; Executors, late J. Anderson, Juliette 2nd of Fairview, 2; J. C. Mann's Heather Bell of Crescent Farm, 3. Ayrshire Derby sweepstakes, for heifers calved between 1st July, 1919, and 30th June, 1920: F. A. Stimpson's Catherine of Fairfield, 1; F. A. Stimpson's Aggie Acme of Fairfield, 2; L. H. Paten's Cornflower 2nd of Jeyandel, 3.

Champion Ayrshire Cow: J. Holmes's Belle of Longlands. Reserve champion cow: P. Bell's Beauty 3rd of St. Helena.

Cow or heifer giving greatest yield of butter fat for twenty-four hours under Babcock test, milk to contain on an average not less than 3.3 per cent. of butter fat: Executors of late John Anderson's Jeanette R. 3rd of Invercauld, 1; H. M. Penal Establishment's St. Helena Jeannie 3rd, 2; Jonas Holmes's Peggy 3rd of Longlands, 3.

Bull, 4 years and over: P. Bell's Prince Roy of Longlands, 1; G. E. Brown's Jamie of Wanora, 2; F. A. Stimpson's St. Helena Premier, 3; P. Bell's Bobs of Fairfield, 4. 3 and under 4 years: J. H. Fairfax's Jellieco of Marinya. 2 and under 3 years: J. Holmes's Prince of Fairview, 1; J. Holmes's Viceroy of Longlands, 2; Executors, late J. Anderson, Jackeroo of Fairview, 3. 1 and under 2 years: F. A. Stimpson's Duncan of Fairview, 1; J. C. Mann's Heather Boy of Crescent Farm, 2; J. Holmes's Gallant Hero of Longlands, 3. Bull calf: H.M. Penal Establishment, St. Helena, St. Helena Mischief Maker, 1; J. Holmes's Sir Tristham of Longlands, 2; Penal Establishment's St. Helena Principal, 3.

JERSEYS.

Judge, Mr. W. Carter.

Cow, 5 years and over, in milk: W. and D. Carr's Larkspur, 1; E. Burton's Oxford Girl, 2; J. Williams's Carlyle Lady Lynn, 3; J. Sinnamon's Ferns Barleycorn, 4. 4 and under 5 years, in milk: J. Sinnamon's Oxford Hazel, 1; E. Burton's Oxford Palatine's Gem, 2. 3 and under 4 years, in milk: E. Burton's Oxford Golden Buttercup, 1; J. Sinnamon's Oxford Barleycorn 2nd, 2; W. W. Mallet's The Endless Chain, 3. Heifer, 2 and under 3 years, in milk: Wm. Sprenger's Carnation Lucy, 1; H. H. Domin's Oxford Golden Rosette, 2; J. F. Burnett's Golden Lass of Rosehill, 3. 1 and under 2 years, in milk: E. Burton's Oxford Noble Buttercup, 1; W. W. Mallet's Sultane's Pride of Burnleigh, 2; J. F. Burnett's Fanny of Rosehill, 3. Cow, 4 years and over, in calf, 6 months or dry: W. and D. Carr's Carlyle Lark, 1. E. Burton's Oxford Buttercup 4th, 2; T. Mullen's Lady Lass 3rd, 3; W. S. Conochie's Sultane 5th of Oaklands, 4. 3 and under 4 years, in calf or dry: H. H. Domin's Oxford Palatine Safety, 1; W. and D. Carr's Carlyle Larkspur, 2; J. Williams's Oxford Noble Dot 3rd, 3. Heifer, 2 and under 3 years, in calf or dry: J. Sinnamon's Trinity Sultane's Lass. Heifer, 1 and under 2 years, dry: E. Burton's Oxford Noble Bell, 1; W. and D. Carr's Carlyle Songstress 2nd, 2; J. Collins's Queen of Calton, 3. 6 and under 12 months: E. Burton's Oxford Primrose, 1; T. Mullen's Norwood Rosebud, 2; W. and D. Carr's Carlyle Flower, 3.

Children's Calf Class.—Heifer calf, 6 months and under 1 year: Miss Leila Carr's Carlyle Bessie Woodside, 1; Master R. Hays's Kenmore Queenie, 2; Miss E. M. Hays's Kenmore Fairy 2nd, 3. Cow or heifer, Australian bred: E. Burton, 1 and 3; J. Williams's Carlyle Lady Lynn, 2.

Champion Jersey cow: W. and D. Carr's Larkspur. Reserve champion: E. Burton's Oxford Girl.

Bull, 4 years and over: E. Burton's Oxford Golden Noble, 1; J. Sinnamon's Noble Palatine, 2; W. S. Conochie's Oxford Palatine Sultan, 3; F. G. Burton's Montrose Jack, 4.

Bull, 3 and under 4 years: W. and D. Carr's Empire of Woodside, 1; T. A. Petherick's Trinity Alfriston Duke, 2. 2 and under 3 years: W. W. Mallet's Trinity Baron, 1; E. Burton's Oxford Fairy Prince, 2; J. Sinnamon's Ginger Duke, 3.

Children's Calf Class.—Bull calf, 6 and under 12 months: T. Mullen's, junior, Norwood Model.

Cow or heifer giving greatest yield of butter fat for twenty-four hours under Babcock test, as above: E. Burton's Oxford Buttercup 4th, 1; T. Mullen's Lady Lass 3rd, 2; E. Burton's Oxford Golden Buttercup, 3.

Groups.—Sire and three of his progeny: E. Burton's Oxford Golden Noble and progeny, 1; W. and D. Carr's Empire of Woodside and progeny, 2; W. W. Mallet's Trinity Baron and progeny, 3. Two males and six females: E. Burton, 1; J. Sinnamon, 2; W. and D. Carr, 3. Sires' progeny stakes group, Australian bred: E. Burton, 1 and 3; J. Sinnamon, 2.

Bull, 1 and under 2 years: E. Burton's Werribee Clementine's King, 1; J. Sinnamon's Lord Ettrey of Danyule, 2; W. J. H. Austin's Premier of Rosehill, 3. Bull calf: J. Collins's Retford K.C., 1; J. Sinnamon's Trinity Officer, 2; T. Mullen's Oxford Palatine's Butter Boy, 3.

ILLAWARRA MILKING SHORTHORNS.

Cow, 5 years and over, in milk: S. Mitchell's Fuchsia of Strathdu, 1; A. Pickels's Jean 5th of Blacklands, 2; B. O'Connor's Dahlia 2nd of Hill View, 3; B. O'Connor's Tulip 4th of Hill View, 4. 4 and under 5 years, in milk: R. Mears's Hazel of Marden, 1; A. J. Caswell's Floss of Dualwen, 2; R. J. Morgan's Doreen of Burradale, 3. 3 and under 4 years, in milk: R. E. Freeman's Veresdale Ruby, 1; A. J. Caswell's Rosie 4th of Greyleigh, 2; R. J. Morgan's Dairymead 2nd of Burradale, 3. Heifer, 2 and under 3 years, in milk: A. Pickels's Daffodil of Blacklands, 1; A. C. Payne's Heather 2nd of Hillcrest, 2; Macfarlane Brothers Viola 26th of Darbalara, 3. Cow, 4 years or over, in calf 6 months or dry: W. Middleton's Mabel of Talgai, 1; B. O'Connor's Charm of Glenthorne, 2; A. Pickels's Envy 2nd of Blacklands, 3; R. J. Morgan's Gem of Rosebank, 4. Cow, 3 and under 4 years, in calf or dry: B. O'Connor's Rosebud 2nd of Greyleigh, 1; A. Pickels's Model of Blacklands, 2; B. O'Connor's Ena of Hill View, 3. Heifer, 2 and under 3 years, dry: W. Middleton's Gentle 3rd of Devon Court, 1; G. Brown's Bangle of Blacklands, 2; B. O'Connor's Skylark 2nd of Cosy Camp, 3. Heifer, 1 and under 2 years: C. A. Rossow's Beauty 2nd of Woodleigh, 1; R. Mear's Norah 3rd of Morden, 2; Macfarlane Brothers' Remembrance 9th of Kilbirnie, 3.

Children's Calf Class.—Heifer calf, 6 and under 12 months: Master W. J. Freeman's Crimson of Edenvale, 1; Master R. Freeman's Bud, 2; Master J. Hunt's Iris of Homeleigh, 3.

Champion Illawarra milking shorthorn cow: S. Mitchell's Fuchsia of Strathdu. Reserve champion: A. Pickels's Jean 5th of Blacklands.

Bull, 3 and under 4 years: G. E. J. Chaseling's Thor of Greyleigh, 1; Scot Brothers' Count of Burradale, 2; George Isle's Stella's Chief of Oakdale, 3; C. Key's Masterpiece of Oakdale and R. T. Ward's Charming Lord of Hillview, highly commended. 2 and under 3 years: B. O'Connor's Charm's Dublow of Oakvale, 1; A. C. Payne's Raleigh's Reflection of Glenthorne, 2; W. Caswell's Masterpiece of Greyleigh, 3. 1 and under 2 years: C. E. Franke's Warrior 1st of Hazeldean, 1; G. Rackemann's Spanker of Hanover, 2; A. Kent's Triumph of Oakvale, 2. Bull calf, 6 months and under 1 year, B. O'Connor's Brilliant of Oakvale, 1; A. Pickels's Prince Hugh of Blacklands, 2; Levingstone Brothers' Mystery Prince of Woodleigh, 3. Heifer calf, 6 and under 12 months: R. T. Ward's Fussy of Mount View, 1; B. O'Connor's Wakeful 4th of Oakvale, 2; F. O. Hayter's Fussy 4th of Springfield.

Children's Calf Class.—Bull calf, 6 months and under 1 year: Master W. J. Freeman's Bachelor of Edenvale, 1; Master E. Cochrane's Nabob of Newholme, 2; Master E. J. O'Connor's General of Oakvale, 3.

Cow or heifer giving greatest yield of butter fat for twenty-four hours under Babcock test, as above: R. Mears's Tulip of Morden, 1; J. F. Cochrane's Trixie of Newholme, 2; B. O'Connor's Fairy Queen 2nd of Glenthorn, 3.

Groups.—Sire and three of his progeny: B. O'Connor's Gem's Plum of Hillview and progeny, 1; R. Mears's George of Nestles and progeny, 2; R. J. Morgan's Royalist and progeny, 3. Two males and five females: B. O'Connor, 1; A. Pickels, 2; R. J. Morgan, 3. Sires' progeny stakes group: A. Pickels, 1; B. O'Connor, 2.

Bull, 4 years old and over: F. O. Hayter's Sovereign of Warden, 1; Crowther Brothers' Plum of Hillview, 2; R. J. Morgan's Royalist 2nd of Fairview, 3; W. Middleton's Gay Boy of Tyrone Villa, 4.

Champion Illawarra milking shorthorn bull: F. O. Hayter's Sovereign of Warden. Reserve champion: B. O'Connor's Charm's Dublow of Oakvale.

GUERNSEYS.

Judge, Mr. W. Carter.

Bull, 3 years and over: T. S. Champney's Moonstone, 1 and champion.

FRIESIANS.

Judge, Mr. D. Hutchison.

Cow, 4 years and over, in milk: S. H. Hosking's Margaret Anglin 2nd of Berry, 1; P. P. Falt's Dairymead, 2; Grindles Limited's Lady Creamelle, 3. 3 and under 4 years, in milk: C. Behrendorff's Fanny of Inavale. Heifer, 2 and under 3 years, in milk: F. G. Brown's Maud Rooker Korndyke. Cow, 3 years or over, in calf 6 months, or dry: S. H. Hosking's Duchess of Hanover of Berry. Heifer, 2 and under 3 years, dry: S. H. Hosking's Psyche 2nd of Gwithian, 1; P. P. Falt's Malba of Ryfield, 2. Heifer, 1 and under 2 years: G. Newman's Hamburg of St. Athan, 1; F. G. Brown's Pandora 3rd of Moorombin, 2; Grindles Limited, Johanna of Wolston, 3. Heifer calf, 6 and under 12 months: G. Newman's Maud 4th of St. Athan, 1; C. Behrendorff's Fanny 2nd of Inavale, 2; F. G. Brown's Moorombin Doral, 3.

Children's Calf Class.—Heifer calf, 6 and under 12 months: Master P. R. Alexander's Irene Segis Denmark, 1; Master W. Weaker's Lovely of Glen Carmal, 2; Miss Nellie Falt's Queenie of Ryfield, 3.

Champion Friesian cow: S. H. Hosking's Margaret Anglin 2nd of Berry. Reserve champion: F. G. Brown's Maud Rooker Korndyke.

Bull, 4 years and over: G. Newman's Dominion Domino's Dutch Boy, 1; S. S. Holmes's Marso of Berry, 2; C. Behrendorff's Cordyline Mascot, 3. 3 and under 4 years: Grindles Limited's Black Prince, 1; E. C. McConnel's Victory Paxton of Monavale, 2; E. J. Wecker's Prince Colantha Oaklea, 3. 2 and under 3 years: R. G. McLeod's Menelaus of St. Athan. 1 and under 2 years: F. Pearce's Daman of St. Gwithian, 1; R. S. Alexander's Sir Cluny Colantha, 2; M. Mumford's Star of Cressbrook, 3. 6 and under 12 months: G. Newman's Duncie of St. Athan, 1; C. Behrendorff's Sundial of Inavale, 2; E. J. Wecker's King Hector of Glen Carmal, 3.

Children's Calf Class.—Bull calf, 6 and under 12 months: Master G. Hosking's Pontiac of St. Gwithian.

Cow or heifer giving greatest yield of butter fat for twenty-four hours under Babcock test, as above: S. H. Hosking's Margaret Anglin 2nd of Berry, 1; P. P. Falt's Oaklea Noreen, 2; P. P. Falt's Dairymaid, 3; Grindles Limited's Lady Creamelle, 4.

Group.—Sire and three of his progeny, 6 months old and over: C. Behrendorff. Two males and five females: G. Newman.

Champion Friesian bull: R. G. McLeod's Menelaus of St. Athan. Reserve champion: Grindles Limited's Black Prince.

FAT CATTLE.

Judge, Mr. H. Friend.

Champion, best bullock: W. Ross Munro. Pen of three bullocks, over 4 years, uniform breed: I. J. and M. S. Moore, 1; J. Collins and Sons, 2. Three bullocks, 3 to 4 years, suitable freezing, to weigh 650 to 750 lb.: I. J. and M. S. Moore. Three bullocks, not over 4 years, most suitable for export, to weigh 600 to 800 lb.: Wagner and Surawski. Three Hereford bullocks, under 4 years: I. J. and M. S. Moore, 1; Godfrey Morgan, 2. Three bullocks, under 4 years, uniform breed: I. J. and M. S. Moore, 1; Wagner and Surawski, 2. Three bullocks, not over three years: I. J. and M. S. Moore. Three bullocks, most suitable freezing, H. J. Winton. Three steers, over 2 and under 3 years: I. J. and M. S. Moore. Bullock, not over 6 years: W. Ross Munro: 1 and champion; H. Mort and Son, 2. Bullock, under 4 years: I. J. and M. S. Moore, 1; J. Collins and Sons, 2. Steer, under 3 years: I. J. and M. S. Moore, 1. Cow, not over 6 years: Macansh Estates Limited, 1. Heaviest bullock: W. Ross Munro; weight 18 cwt. 2 qr. 7 lb. Bullock for export purposes: I. J. and M. S. Munro, 1; J. Collins and Sons, 2. Bullock, for local consumption: H. Mort and Son, Limited, 1; J. Collins and Sons, 2.

STUD SHEEP.

Judge, Mr. W. B. Slade.

Merinos (strong-woolled).—Ram, 3 years and over: Lord Bros., 1, 2, and 3. Ram, 2 and under 3 years: H. M. Collins, 1 and 2; Lord Bros., 3. Ram, under 2 years, to have been shorn as a lamb: Lord Bros., 1 and 2. Ewe, 3 years and over: Lord Bros., 1 and 2. Ewe, 2 and under 3 years: Lord Bros., 1, 2, and 3. Ewe, under 2 years, to have been shorn as a lamb: Lord Bros., 1 and 2.

Merinos (fine-woolled).—Ram, 3 years and over: Lord Bros., 1 and 2. Ram, under 2 years, to have been shorn as a lamb: Lord Bros., 1. Ewe, 3 years and over: Lord Bros., 1 and 2. Ewe, under 2 years, to have been shorn as a lamb: Lord Bros., 1 and 2.

Groups (strong-woolled merinos).—Pen of five merino rams, over 1 and under 2 years: Lord Bros. Pen of five merino ewes, over 1 and under 2 years: Lord Bros.

Championships.—Strong-woolled merino ram, champion: H. M. Collins. Reserve champion: Lord Bros. Strong-woolled merino ewe, champion and reserve champion: Lord Bros. Fine-woolled merino ram, champion and reserve champion: Lord Bros. Fine-woolled merino ewe, champion and reserve champion: Lord Bros.

Judge, Mr. W. G. Brown.

British Breeds.—Lincolns, ewe, any age: S. E. Pullen. Romney Marsh, ram, any age: S. E. Pullen. Corriedales, ram, any age: J. H. Fairfax, 1 and 2. Ewe, any age: J. H. Fairfax, 1 and 2.

FAT SHEEP.

Judge, Mr. W. A. Nason.

Pen of five merino wethers, over 50 lb. weight: Jondaryan Estates Company of Australia, Limited, 1; E. J. McDonough, 2. Under 50 lb.: E. J. McDonough, 1; A. T. Creswick, 2. Most suitable for freezing: E. J. McDonough, 1; Jondaryan Estates Company, 2. Most suitable for butcher's trade: E. J. McDonough, 1; A. T. Creswick, 2. Pen of five merino lambs: S. E. Pullen, 2. Pen of five crossbred wethers, 70 lb. or over: Cecil Flemming, 1; J. H. Fairfax (Corriedales), 2. Pen of five crossbred wethers: S. E. Pullen, 1 and 2. Pen of five crossbred wethers: S. E. Pullen, 1; J. H. Fairfax, 2. Pen of five crossbred wethers, freezing quality: S. E. Pullen. Pen of five wethers, suitable freezing and export: E. J. McDonough. Pen of five crossbred lambs, suitable export as freezers: Stirling Bros., 1; S. E. Pullen, 2. Pen of five crossbred lambs, judged irrespective of weight: J. H. Fairfax, 1; Stirling Bros., 2. Pen of ten fat lambs, most suitable export: Stirling Bros. Pen of five lambs, most suitable freezing: J. H. Fairfax, 1; Stirling Bros., 2.

Single Exhibits.—Heaviest crossbred wether: S. E. Pullen, 1; J. H. Fairfax, 2. Heaviest merino wether: A. T. Creswick, 1; Jondaryan Estates Company, 2. Heaviest crossbred ewe: S. E. Pullen, 1; C. E. McDougall, 2. Heaviest merino ewe: Lord Bros.

SWINE.

Judge, Mr. E. J. Shelton.

Boars.—Over 18 months: W. J. Warburton, Northgate Item 2nd, 1; J. H. Cowen, Korumburra Sonny, 2. Between 9 and 18 months: W. J. Warburton, Northgate Duke 2nd. Between 6 and 9 months: J. H. Cowen, Cremorne Geoff, 1; W. J. Warburton, Northgate Sport, 2. Under 6 months: J. H. Cowen, Cremorne Fatty, 1; W. J. Warburton, Northgate Chance, 2. Pen of three Berkshire boars, under 16 weeks: J. H. Cowen, Cremorne Chief, Cremorne King, Cremorne Prince. Boar and three

progeny: J. H. Cowen, Korumburra Sonny and progeny, 1; W. J. Warburton, Northgate Item 2nd, 2. Champion boar: W. J. Warburton, Northgate Item 2nd. Reserve champion: J. H. Cowen, Korumburra Sonny.

Improved Berkshires.—Sows, over 18 months: H. B. Ellerton, Serang Maid, 1; J. H. Cowen, Lawrence Countess, 2; W. J. Warburton, Northgate Diamond Belle, 3. Between 9 and 18 months: W. J. Warburton, Northgate Diana. Between 6 and 9 months: W. J. Warburton, Black Tip, 1; Pretty Face, 2; C. Behrendorff, Inavale Daisy, 3. Under 6 months: W. J. Warburton, Lady Jane, 1; J. H. Cowen, Cremorne Peggy, 2; H. B. Ellerton, Goodna Dainty, 3. Pen of three sows, under 16 weeks: C. Behrendorff, 1; J. H. Cowen, 2. Champion sow: H. B. Ellerton, Serang Maid. Reserve champion: W. J. Warburton, Northgate Diana.

Yorkshires.—Boars, over 18 months: W. J. Warburton, Northgate My Lad. Between 9 and 18 months: W. J. Warburton, Newington Adventure. Under 6 months: W. J. Warburton, Major. Pen of three boars: W. J. Warburton. Champion boar: W. J. Warburton, Northgate My Lad. Reserve: W. J. Warburton, Newington Adventure.

Sows, over 18 months: W. J. Warburton, Northgate Gladdo. Between 9 and 18 months: W. J. Warburton, Northgate Shirley. Between 6 and 9 months: W. J. Warburton, Northgate Gem, 1; Northgate Daisy, 2. Under 6 months: W. J. Warburton, Northgate Snowy. Any age, in milk, with litter of not less than six suckers, not over 10 weeks old: W. J. Warburton, Northgate Ruth. Pen of three sows: W. J. Warburton. Champion sow: W. J. Warburton, Northgate Gladdo. Reserve champion: W. J. Warburton, Northgate Shirley.

Tamworths.—Boar, 18 months and over: W. W. Arnett, Sandy Macqueen, 1; J. H. Whittaker, Meddlesome Duke, 2. Boar, 9 months and under 18 months: J. H. Whittaker, Prince Royal. Boar, 6 months and under 9 months: Boorie Stud Farm, Ginger of Boorie, 1; Boorie Stud Farm, Sandy of Boorie, 2. Boar, under 6 months: W. W. Arnett, Rouse Hill Jim, 1; J. H. Whittaker, The Conqueror, 2; W. W. Arnett, Rouse Hill Sandy 2nd, 3.

Champion boar: W. W. Arnett, Sandy Macqueen. Reserve champion: J. H. Whittaker, Prince Royal.

Sow, 18 months and over: J. H. Whittaker, Knowles Princess 2nd, 1; J. H. Whittaker, Indian Princess, 2. Sow, 9 months and under 18 months: W. W. Arnett, Manning Ruby, 1; J. H. Whittaker, Perfection, 2; J. H. Whittaker, Poppy, 3. Sow, 6 months and under 9 months: J. H. Whittaker, Forget-me-not, 1; J. H. Whittaker, Wild Rose, 2; J. H. Whittaker, Blossom, 3. Sow, under 6 months: W. W. Arnett, Rouse Hill Myra, 1; W. W. Arnett, Rouse Hill Molly, 2; J. H. Whittaker, Pretty Polly, 3. Sow, any age, in milk: J. H. Whittaker, Perfection, 1; J. H. Whittaker, Carnation, 2.

Champion sow: W. W. Arnett, Manning Ruby. Reserve champion: J. H. Whittaker, Perfection.

Poland-China, boar, 6 months old and under 15 months: Boorie Stud Farm, Judge 3rd of Boorie.

Duroc-Jerseys, boar, any age: F. G. Brown's entry. Sow, any age: F. G. Brown's entries, 1 and 2.

Miscellaneous.—Three bacon pigs, any breed, 110 to 140 lb., estimated dressed weight: J. Fitzgerald, 1; C. Bright, 2. Three porker pigs, 60 to 80 lb.: H. McNeilly, 1; J. Fitzgerald, 2.

Additional Awards.—Poland-China, boar, 6 months old and under 15 months: J. T. Collett, Billy, 2. Pen of three young boars, under 6 months: J. T. Collett's entry. Pen of three young sows, under 6 months: J. T. Collett, 1; Boorie Stud Farm, 2.

FARM PRODUCE.

Judge, Mr. H. C. Quodling.

Maize, large yellow, improved yellow Dent: W. T. Beverley, 1; T. Fisher, 2. Horse tooth: H. Franke. Yellow Dent: H. Franke. Medium yellow, golden beauty: T. Fisher, 1; H. Lindner, 2. Yellow Dent: H. Franke, 1; H. C. Harvey, 2. Yellow peg tooth type: T. Fisher, 1; H. Franke, 2. Small yellow, early Leaming: H. Franke, 1; O. C. Granzien, sen., 2; C. J. Ryman, 3. Reid's funks or James's yellow Dent: H. Lindner. Early yellow Dent: H. Franke, 1; K. Haag, 2. So-called ninety-day, small yellow: H. Franke, 1; C. S. Huxley, 2; K. Haag, 3. White varieties.—Large white: A. Loweke. Hickory king: O. C. Granzien, sen., 1; H. Franke, 2. Bone county, white: A. Loweke. Brazilian white: C. Behrendorff. Red varieties.—Red Hogan: H. Franke, 1; C. Behrendorff, 2; T. Fisher, 3. Sydney red: H. Franke. Red butcher: W. T. Beverley, 1 and 2. Small, early red: J. Logan. Sweet corn, any variety: H. Franke, 1 and 2. Pop corn: J. Donges, 1; H. Franke, 2. Maize ears, red: H. Franke. Wheat, medium strong flour: W. Dearling, 1; W. Auchter, 2 and 3. Weak flour wheat: W. Auchter. Best exhibit of wheat: Geitz Bros., 1; C. S. Huxley, 2; Geitz Bros., 3. Oats, Algerian or Sunrise: W. Dearling, 1; C. Behrendorff, 2. Rye: K. Haag. Hay, lucerne, best dry: Major B. C. Bell, 1; J. Campbell, 2. Hay, lucerne, sweated: J. Campbell, 1; C. Behrendorff, 2. Oaten: C. S. Huxley, 1; T. Fisher, 2. Wheaten: W. Auchter. Straw: W. Auchter, 1; C. S. Huxley, 2. Soudan grass: H. Franke, 1; W. Auchter, 2. Maize, stover: H. Franke, 1; C. S. Huxley, 2. Millet or panicum: T. Fisher, 1; H. Franke, 2. Rhodes: W. Auchter. Bush: W. Auchter. Three sheaves, oats, Algerian: T. Fisher, 1; J. Donges, 2. Three sheaves, oats, Tartarian: B. H. W. Berlin, 1 and 2. Three sheaves, wheaten: W. Auchter, 1; J. Donges, 2. Chaff, lucerne, dry: W. T. Beverley, 1; J. E. Stanton, 2. Sweated: Major B. C. Bell, 1; J. Campbell, 2; W. Dearling, 3. Oaten: C. S. Huxley, 1; C. J. Ryman, 2. Wheaten: C. S. Huxley, 1; L. Auchter, 2. Canary: H. Franke. Soudan grass: W. Auchter, 1; H. Franke, 2. Millet or panicum: H. Franke, 1; K. Haag, 2; J. Logan, special 1st. Grass hay: H. Franke, 1; W. Auchter, 2. Wheaten straw: W. Auchter, 1; W. Dearling, 2. Straw: J. Campbell, 1; H. Franke, 2; W. Auchter, 3. Ensilage (chaff): F. G. Brown, 1; C. Behrendorff, 2. Ensilage (whole stalk): F. G. Brown, 1 and 2. Saccharine sorghums.—Saccharine: E. J. Keys. Sorghum saccharatum: H. Franke. Planters' friend: B. H. W. Berlin, 1; H. Franke, 2; C. Behrendorff, 3. Amber cane: H. Franke, 1; K. Haag, 2. Soudan grass: C. Behrendorff. Broom millet, seed: H. Franke. Panicum and fodder millet.—Liberty millet: B. H. W. Berlin, 1; C. S. Huxley, 2; J. Campbell, 3. White seeded French millet: T. Fisher. Japanese millet: B. H. W. Berlin. White panicum: B. H. W. Berlin, 1; C. Behrendorff, 2; H. Lindner, 3. Manchurian millet: H. Lindner. Pasture grass seeds.—Lucerne: C. S. Huxley, 1; Major B. C. Bell, 2. Linseed: W. Dearling. Beans and peas.—Haricot: C. S. Huxley. Cowpeas, black: C. Behrendorff. Cowpeas, clay-coloured: C. S. Huxley, 1; K. Haag, 2. Cowpeas, large black-eyed Susan: S. C. Huxley, 1; K. Haag, 2. Cowpeas, any other variety: K. Haag. Yorkshire Hero peas: K. Haag. Miscellaneous.—Giant Russian sunflower: J. Donges. Canary seed of commerce: C. S. Huxley, 1; K. Haag, 2. Cotton, long staple (judge, Mr. D. Jones): W. Grimsey, 1; J. Oln, 2; W. Thompson, 3. Potatoes, Guyra Blues, Coronations, or Commonwealths: C. Seiler, 1; H. Franke, 2; H. C. Harvey, 3. Manhattans: C. Seiler. Brownells, any variety other than Satisfaction: H. Franke, 1; C. J. Ryman, 2. Satisfaction: H. Franke. Carmens: H. C. Harvey. Collection English: H. Franke, 1; C. Seiler, 2. Sweets, red or pink, table variety: J. Seeleither. Yellow Spanish, table variety: J. Seeleither. Champion Brownell: H. Franke. Crown pumpkins, table: O. C. Granzien, sen., 1; J. Logan, 2; H. C. Harvey, 3. Ironbark, table: J. Campbell, 1; H. C. Harvey, 2. Silver Nugget, table: W. T. Beverley, 1; J. Campbell, 2; H. C. Harvey, 3. Pumpkins, cattle: A. Granzien. Marrows: H. C. Harvey. Piemelons: J. Seeleither. Arrowroot: J. Seeleither. Castor oil bean: H. Lindner.

Maize ears, large yellow: H. Franke. Medium yellow: H. Franke. Small yellow: K. Haag, 1; H. Franke, 2. Large white: A. Loweke, 1; H. Franke, 2. Any white variety: A. Loweke, 1 and 2. Small red grain (early): H. Franke, 1. Sweet corn: H. Franke. Popcorn: J. Donges.

Champion maize exhibit: W. T. Beverley. Champion maize ears exhibit: H. Franke.

Barley.—Champion malting barley: W. Dearling.

Hay.—Champion collection: William Auchter.

Chaff.—Champion collection oatens, wheaten, lucerne, and canary chaff: William Auchter.

Potatoes.—Champion blue varieties: C. Seiler. Champion brown varieties: H. Franke. Champion white varieties: H. C. Harvey.

FRUIT.

Judge, Mr. W. Soutter.

Six uncured lemons: W. K. Reach, 1; R. Percival, 2. One case cured lemons: F. Nicklin. Six lemons, suitable for peel: E. Curtis, 1; R. Percival, 2. Three bunches cavendish bananas: W. J. Parker, 1; B. C. Peachey, 2. Three cases bananas: M. H. Gray, 1; Thomas Ivans, 2. Three cases smoothleaf pineapples, packed for export: H. Willmott, 2. Three cases Ripley Queen pineapples, packed for export: H. B. Aplin. Six pineapples, smoothleaf: H. Willmott, 1; W. Dart, 2. Six pineapples, Ripley Queen: H. B. Aplin, 1; H. Willmott, 2. Six pineapples, roughleaf: H. Willmott. Three cases oranges, packed for export, but unwrapped: W. Dart. Three cases oranges, packed for export, wrapped: W. Dart. Six Tahiti limes: W. Dart, 1; C. J. Frost, 2. Six citrons: E. Curtis. Six Emperor of Canton mandarins: E. P. Noakes, 1; W. Hooper, 2. Six scarlet mandarins: J. Steggall, 1; J. C. K. Lethbridge, 2. Six Glen Retreat mandarins: W. Hooper, 1; J. C. K. Lethbridge, 2. Six mandarins, any other variety: W. Dart, 1; E. P. Noakes, 2. Six Valentia oranges, late: R. Percival. Six Mediterranean sweet oranges: W. Hooper. Six Sabina oranges: W. Dart. Six Washington navel oranges: R. Percival, 1; W. Hooper, 2. Six seedling oranges: J. C. K. Lethbridge, 1; W. Hooper, 2. Six Seville oranges: Mrs. R. P. Gale, 1; W. Dart, 2. Six poor man's oranges: C. J. Frost. Six grape fruit: J. A. M. Macnaught. Any new superior variety of citrus fruit: H. K. Roach. Dish of passionfruit: F. G. Gipps, 1; A. Hartley, 2. Six boxes Aurie strawberries: J. A. C. Jackes. Three boxes strawberries: J. A. C. Jackes. Three papaws: E. Parker, 1; W. J. Parker, 2. Six custard apples: R. Percival. Dish of tree tomatoes: A. Wyllie. Granny Smith apples, for export: The Summit Fruitgrowers' and Progress Association, 1; M. E. Sewell, 2. Any other variety apples, for export: The Summit Fruitgrowers' and Progress Association, 1; David Pfrunder, 2.

APICULTURE.

Judge, Mr. W. F. Lyon.

Honey, standard colour, light: A. Smith, 1 and 2; A. T. Baker, 3. Golden: S. L. Uhlmann, 1 and 3; A. Smith, 2. Dark: A. T. Baker, 1; A. Gambling, 2; S. L. Uhlmann, 3. Granulated honey, fine grain: A. Gambling, 1; A. Smith, 2; A. T. Baker, 3. Granulated honey, coarse grain: S. L. Uhlmann, 1; A. S. Douglas, 2; A. T. Baker, 3. Comb and extracted honey: S. L. Uhlmann, 1 and 2; A. S. Douglas, 3. Blocks solid honey, 1 lb. nominal weight: A. T. Baker, 1 and 2. Extracted honey (novice class): J. Jones. Clarity exhibit, best jar extracted honey: A. Gambling. Extracting frame of comb honey, not less than 50 square inches: S. L. Uhlmann. Extracting frame of comb honey, not less than 100 square inches: A. S. Douglas. Beeswax, natural yellow: A. Smith. White: A. Smith. Beeswax for retail trade, white, not less than 4 lb., in tablets: S. L. Uhlmann. Beeswax for retail trade, natural yellow: S. L. Uhlmann, 1; A. T. Baker, 2. Beeswax in trophy form: A. Gambling. Collection of articles showing the uses to which beeswax can be put: A. S. Douglas. Collection and display of apiary products (not by-products), in all forms, suitable for shop window display: A. Smith, 93 points, 1; A. Gambling, 92 points, 2. Observatory hive of Italian bees, showing queen bee: S. L. Uhlmann, 1; J. Jones, 2. Honey vinegar: A. T. Baker. Collection of confectionery made with honey: Mrs. A. Pitkeathly. Collection of cakes made with honey: Mrs. A. Pitkeathly. Collection showing medicinal uses of honey: A. S. Douglas. Champion prize for the best honey exhibited, in classes 1 (light), 2 (golden), 3 (dark), 8 (novice), and 9 (clarity exhibit): J. Jones (Alderley).

SCIENCE NOTES.

By EDMUND JARVIS, Entomologist, Bureau of Sugar Experiment Stations.

FACTORS LIMITING THE INCREASE OF SCOLIID PARASITES.

(1.) *Fungus attacking Larvæ and Adults of Campsomeris tasmaniensis* Sauss.

Being aware that the entomogenous fungus *Metarrhizium anisopliæ* (Metsch.) Sor. is not exclusively parasitic on larvæ, but invades also the adult form of quite a number of insects, experiments were initiated by the writer during June, 1919, with view to determining whether wasps of the genus *Campsomeris* were immune from attack.

Details relating to the technique employed need not be given here, it being sufficient for the present purpose to state that in less than a week after infection of the soil several caged wasps were found dead and covered with green spore masses.

The fungus broke through first between the antennal joints, an indication, perhaps, that disease had been contracted while the insect was forcing its way through the infected soil.

Two wasps placed in cages on 18th June were found dead the following day, one being underground and the other lying on the surface with a particle of milky-looking matter exuding from the anus. When next examined (forty-eight hours after introduction to cages), the fungus had appeared externally on legs and antennæ.

In the light of our present knowledge regarding the action of the green Muscardine fungus under field conditions, its occurrence would not be likely to materially affect the increase of our spring and summer broods of *Campsomeris*. During autumn months, however, I am disposed to believe that the number of wasps victimised by this vegetable parasite may not only equal but perhaps exceed the percentage of cane-grubs destroyed by the fungus in question.

This view appears reasonable when one considers that our digger-wasp, during its aerial existence of about two months, tunnels 9 inches or more into the ground once or twice each day, visiting all sorts of localities and classes of soils, and constructing a subterranean chamber at the end of every drive, and would, therefore, at some time during these excavations be very likely to run again soil containing spores of the "Green Muscardine" fungus.

On the other hand, we know that cane-grubs, when located under a stool, usually remain there, close to their food, seldom moving about more than is necessary, and accordingly incurring far less risk of infection from spores of entomogenous fungi.

A young larvæ of *C. tasmaniensis* Sauss. derived from an egg laid on 24th May on *Lepidoderma albobirtum* Waterh. was noticed, some days later, to be covered with *Metarrhizium* fungus.

Curiously enough, the host-grub was not in the least affected, although the maggot of the parasite had been dead some days, and masses of ripe spores had developed.

(2.) *Premature Death of Host from Abnormal Stinging.*

Occasionally a digger-wasp, instead of paralysing its host-grub in the usual manner (see Bull. No. 7, Qld. Bur. Sug. Expt. Stations, Div. Ent., p. 21), deals an almost fatal thrust of the sting, delivered perhaps in a wrong place by mistake, under stress of danger or excitement consequent upon having made a false move whilst attacking; for it must not be forgotten that this strange combat to the death between grub and parasite takes place below ground in the dark, where the dangerous proximity of mandibles and sting being, presumably, invisible to either party, would need to be instantly located by some instinctive sense of feeling that we do not understand.

The economic significance of such abnormal stinging, however, does not appear to be appreciated by the parasite, since it will oviposit as usual on such over-stung hosts, although the resultant maggot, after hatching, be doomed to perish owing to premature decay of the former. A third-stage grub of *albobirtum*, for example, was stung in this manner by a specimen of *C. radula* on 17th April and died three days later.

The effect produced by such abnormal stinging is rather remarkable. Instead of becoming flaccid as usual, the grub stiffens and appears bloated, as though it had been boiled, assuming a U-shaped form, and remaining quite rigid in the cell until after death.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR JULY, 1922.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Dear Lassie ...	Ayrshire ...	19 June, 1922	960	3.9	43.80	
Hedges Nattie ...	Friesian ...	20 May, "	780	4.1	37.50	
College Cold Iron	Jersey ...	25 Jan., "	540	5.7	36.30	
Prim ...	Friesian ...	16 Feb., "	930	3.1	33.60	
Miss Fearless ...	Ayrshire ...	30 May, "	720	3.8	32.10	
Songstress ...	"	4 July, "	756	3.4	29.96	
Dawn of Warragaburra	Jersey ...	17 May, "	480	5.1	28.80	
Little Buttercup...	Friesian ...	12 Dec., 1921	690	3.5	28.20	
Lute ...	Ayrshire ...	8 Jan., 1922	540	4.2	26.70	
Snowflake ...	Shorthorn...	20 Feb., "	570	4.0	26.30	
Skylark ...	Ayrshire ...	7 Feb., "	510	4.4	26.10	
Gay Lassie ...	"	20 Feb., "	420	5.2	25.80	
Miss Betty ...	Jersey ...	17 May, "	426	5.2	25.80	
Buttercup ...	Shorthorn...	28 Oct., 1921	576	3.8	25.60	
College Prima Donna	Friesian ...	27 Nov., "	540	3.9	24.60	
Magnet's Leda ...	Jersey ...	8 Feb., 1922	450	4.7	24.60	
College Cobalt ...	"	3 April, "	420	4.7	23.10	
College Nancy ...	Friesian ...	16 June, "	510	3.7	21.90	
College Ma Petite	Jersey ...	5 Feb., "	390	4.8	21.90	
La Hurette Hope	"	30 June, "	465	4.0	21.70	
Rosine ...	Ayrshire ...	18 May, "	510	3.6	21.30	
Sheila of Nundorah	Guernsey ...	16 April, "	360	5.0	21.00	
College Wildflower	Jersey ...	10 Dec., 1921	360	5.0	21.00	
Auntie's Lass ...	Ayrshire ...	31 Oct., "	434	4.1	20.77	
College Nita ...	Friesian ...	26 Feb., 1922	480	3.7	20.70	
Lady Mitchell ...	"	20 Dec., 1921	450	3.9	20.40	
Lady Annette ...	Ayrshire ...	2 Jan., 1922	360	4.8	20.10	

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JULY, 1922.

Extremely cold weather was again experienced during the month of July, which considerably upset the laying. One death occurred, bowel trouble being the cause, otherwise we had a very good result for the month. Several of the leading pens are again doing good work. The White Leghorns are in the lead with a score of 148 eggs to Mr. N. A. Singer's pen; also his B bird has made a good run, unbroken, of 48 eggs. Mr. C. H. Singer's pen takes second place with a score of 147, also White Leghorns. The third pen is that owned by Messrs. W. and G. W. Hindes, with a score of 120. In the heavy breeds the best score for the month is 122 made by Mr. C. C. Dennis's pen, R. Holmes being second with 120, and R. Burns third with 116 eggs. The following are the individual records:—

Competitors.	Breed.	July.	Total.
LIGHT BREEDS.			
*W. and G. W. Hindes ...	White Leghorns	120	416
*N. A. Singer ...	Do.	148	411
C. H. Singer ...	Do.	147	392
*Bathurst Poultry Farm ...	Do.	92	372
*Geo. Trapp ...	Do.	98	332
*T. Fanning ...	Do.	109	332
*W. A. Wilson ...	Do.	102	328
J. H. Jones ...	Do.	91	328

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	July.	Total.
LIGHT BREEDS— <i>continued.</i>			
*Mrs. L. Andersen	White Leghorns	103	319
A. G. C. Wenck	Do.	83	317
*S. L. Grenier	Do.	97	310
*W. Becker	Do.	85	303
*G. Williams	Do.	96	297
*O. Goos	Do.	88	293
*J. M. Manson	Do.	103	292
*H. P. Clarke	Do.	102	291
B. Hawkins	Do.	85	291
*R. Gill	Do.	112	291
J. Purnell	Do.	75	285
A. Maslin	Do.	100	279
*R. C. Cole	Do.	96	272
*Mrs. E. White	Do.	86	271
*H. Fraser	Do.	76	271
*J. W. Newton	Do.	74	268
*C. Goos	Do.	81	255
*Oakleigh Poultry Farm	Do.	97	242
T. H. Craig	Do.	65	242
G. F. Richardson	Do.	78	240
*M. F. Newberry	Do.	98	236
*J. W. Short	Do.	93	234
*C. M. Pickering	Do.	93	233
*Mrs. R. Hodge	Do.	97	232
E. Stephenson	Do.	51	230
*F. Birchall	Do.	84	226
*Thos. Taylor	Do.	89	222
N. J. Nairn	Do.	75	222
B. C. Bartlem	Do.	56	220
*R. C. J. Turner	Do.	87	213
*E. A. Smith	Do.	64	211
E. Symens	Do.	69	203
A. Anders	Do.	38	178
Brampton Poultry Farm	Do.	59	158
H. Trappett	Brown Leghorn	59	132
Parisian Poultry Farm	Do.	13	24

HEAVY BREEDS.

*A. E. Walters	Black Orpingtons	106	386
*R. Holmes	Do.	120	352
*R. Burns	Do.	116	344
*H. M. Chaille	Do.	108	339
Jas. Hutton	Do.	105	330
*T. Hindley	Do.	112	328
Mrs. A. Kent	Do.	78	327
Wambo Poultry Farm	Do.	50	315
*Rev. A. McAllister	Do.	85	279
*E. F. Dennis	Do.	88	279
*C. C. Dennis	Do.	122	265
*J. Potter	Do.	111	258
Mrs. A. E. Gallagher	Do.	84	258
Mrs. L. Maund	Do.	87	240
R. Iunes	Do.	13	231
V. J. Rye	Do.	82	212
C. Doan	Do.	91	208
Jas. Hitchcock	Do.	64	199
H. B. Stephens	Do.	70	186
C. Rosenthal	Do.	54	181

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	July.	Total.
HEAVY BREEDS— <i>continued.</i>			
W. Becker	Chinese Langshans ...	109	178
*Parisian Poultry Farm	Black Orpingtons ...	97	166
W. C. Trapp	Do.	77	151
*J. E. Smith	Plymouth Rocks ...	60	84
R. Burns	Silver-laced Wyandottes ...	62	83
*Miss L. Hart	Rhode Island Reds ...	5	6
Total ... ..	...	6,060	17,896

* Indicates that the pen is being single tested.

DETAILS OF SINGLE HEN TESTS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
W. and G. W. Hindes	83	57	76	68	76	56	416
N. A. Singer	56	83	61	71	67	73	411
Bathurst Poultry Farm	53	48	67	70	79	55	372
Geo. Trapp	69	44	42	63	55	59	332
T. Fanning	37	75	61	65	77	17	332
W. A. Wilson	51	47	42	69	53	66	328
Mrs. L. Andersen	70	34	58	55	47	55	319
S. L. Grenier	47	27	60	56	59	61	310
W. Becker	43	28	63	49	52	68	303
G. Williams	42	55	58	50	46	46	297
O. Goos	48	32	59	69	54	31	293
J. M. Manson	48	33	61	31	68	51	292
H. P. Clarke	53	33	51	57	52	45	291
R. Gill	58	55	62	43	29	44	291
R. C. Cole	53	56	58	21	43	41	272
Mrs. E. White	60	11	47	37	61	55	271
H. Fraser	48	61	46	37	32	47	271
J. W. Newton	66	46	54	26	50	26	268
C. Goos	30	30	27	51	66	51	255
Oakleigh Poultry Farm	52	29	45	41	28	47	242
M. F. Newberry	41	23	30	69	24	49	236
J. W. Short	41	42	53	32	21	45	234
C. M. Pickering	57	53	21	36	43	23	233
Mrs. R. Hodge	63	10	36	38	53	32	232
F. Birchall	40	43	12	35	50	46	226
Thos. Taylor	55	22	44	40	39	22	222
R. C. J. Turner	38	24	49	46	42	14	213
E. A. Smith	53	24	52	42	17	23	211
HEAVY BREEDS.							
A. E. Walters	61	59	61	59	73	73	386
R. Holmes	46	71	59	59	54	63	352
R. Burns	48	64	44	64	60	61	341
H. M. Chaille	75	48	66	63	57	30	339
T. Hindley	30	59	27	90	88	34	328
Rev. A. McAllister	52	60	74	27	9	57	279
E. F. Dennis	50	43	67	7	49	63	279
C. C. Dennis	43	55	51	35	47	34	265
J. Potter	37	47	56	48	52	18	258
Parisian Poultry Farm	15	34	36	8	39	34	166
J. E. Smith	0	22	11	7	21	23	84
Miss L. Hart	0	3	1	2	0	0	6

CUTHBERT POTTS, Principal.

NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION COMPETITION.

By arrangement with the Council of the National Utility Poultry Breeders' Association the results of their egg-laying competition will hereafter be published monthly.

During August, 2655 eggs were laid by the birds in the N.U.P.B.A. competition at Zillmere, on an average of just over 22 eggs per bird. No. 79, a White Leghorn belonging to Mr. W. Bliss, laid 31 eggs in the month. The birds generally are in good health, and doing well. No. 85 was replaced and previous score struck out. Details:—

Pen No.	Owner.	August.	Total.	Pen No.	Owner.	August.	Total.
WHITE LEGHORNS.							
29	A. S. Walters ...	26	125	10	P. Ruddick ...	23	88
2	A. Niel ...	26	118	69	A. Hodge ...	22	88
33	J. Purnell ...	27	118	8	J. Harrington ...	19	87
62	H. Sturman ...	24	115	41	G. Williams ...	21	87
19	L. Anderson ...	24	113	42	G. Williams ...	23	87
43	J. Davies ...	25	113	52	F. R. Koch ...	25	87
66	A. Cowley ...	25	112	46	H. Needs ...	21	86
38	Carinya Poultry Farm	19	111	59	C. M. Pickering ...	21	85
77	Kelvin Poultry Farm	27	111	17	R. Shaw ...	22	84
27	Oakleigh Poultry Farm	26	109	67	R. D. Chapman ...	19	84
72	Enroh Pens ...	24	109	22	E. Stevenson ...	20	80
7	J. Harrington ...	24	107	54	A. W. Ward ...	23	80
25	P. F. Adams ...	23	107	26	D. F. Adams ...	23	79
64	G. Trapp ...	26	106	73	A. F. Knowles ...	22	79
12	J. Potter ..	24	105	18	R. Shaw ...	23	78
34	J. Purnell ...	24	105	56	W. H. Lingard ...	19	77
61	H. Sturman ...	22	104	58	M. Newberry ...	28	77
47	M. J. Lyons ...	23	104	40	P. J. Fallon ...	23	76
16	F. Flood ...	25	103	79	W. Bliss ...	31	76
70	A. Hodge ...	23	103	51	F. R. Koch ...	22	75
24	M. H. Campbell...	20	100	76	A. J. Bourne ...	21	74
55	W. H. Lingard ...	24	97	65	A. Cowley ...	20	72
36	Parisian Poultry Farm	18	96	37	Carinya Poultry Farm	23	71
63	G. Trapp ...	24	96	15	T. Flood ...	16	70
28	Oakleigh Poultry Farm	17	95	5	Wombo Poultry Farm	18	66
30	A. S. Walters ...	19	95	20	L. Anderson ...	23	66
35	Parisian Poultry Farm	21	95	60	C. M. Pickering ..	19	64
68	R. D. Chapman ...	23	95	81	E. C. Raymond ...	22	64
82	E. C. Raymond ...	19	94	14	J. Hutton ...	20	63
44	J. J. Davies ...	22	94	11	J. Potter ...	15	61
39	P. J. Fallon ...	22	93	31	R. H. Woodcock	17	60
48	M. J. Lyons ...	24	93	45	H. Needs ...	19	60
57	M. Newberry ...	19	93	50	R. Turner ...	21	56
74	A. F. Knowles ...	19	93	71	Enroh Pens ...	24	55
6	Wombo Poultry Farm	21	92	80	W. Bliss ...	22	53
9	P. Ruddick ...	24	91	28	M. H. Campbell...	28	51
13	J. Hutton ...	23	91	78	Kelvin Poultry Farm	22	47
53	A. W. Ward ...	21	91	1	A. Neil ...	3	45
49	R. Turner ...	21	89	3	W. Becker ...	23	43
				4	W. Becker ...	17	42
				32	R. H. Woodcock	17	31
				75	A. J. Bourne ...	23	26
				21	E. Stevenson ...	21	24

NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION COMPETITION—continued.

Pen No.	Owner.	August.	Total.	Pen No.	Owner.	August.	Total.
BLACK ORPINGTONS.							
107	E. Walters ...	28	115	99	L. J. Prichard ...	21	87
89	T. Brotherton ...	24	114	102	Parisian Poultry Farm	21	83
96	R. A. Boulton ...	27	112				
88	W. A. Blake ...	29	109	106	H. Pearse ...	26	82
92	P. C. Dennis ...	28	104	84	J. Hutton ...	26	80
105	H. Pearce ...	24	104	110	Wambo Poultry Farm	22	76
101	Parisian Poultry Farm	22	102				
86	Kidd Bros. ...	20	98	109	Wambo Poultry Farm	20	72
103	J. Potter ...	18	98	110	A. Neil ...	24	67
95	R. A. Boulton ...	28	95	94	E. F. Dennis ...	8	64
108	G. Walters ...	23	95	89	T. H. Brotherton	28	63
104	J. Potter ...	24	91	87	W. A. Blake ...	23	60
93	E. F. Dennis ...	24	93	98	Enrol Pens ...	20	57
100	L. J. Prichard ...	24	93	112	A. Neil ...	25	43
83	J. Hutton ...	22	91	97	Enrol Pens ...	18	24
91	C. C. Dennis ...	26	91	85	Kidd Bros. ...	10	10
OTHER BREEDS.							
118	P. H. Jones ...	25	110	119	T. J. Carr ...	24	62
120	T. J. Carr ...	25	91	115	G. and W. Hinds	20	52
117	J. H. Jones ...	20	90	113	Parisian Poultry Farm	21	45
116	D. and W. Hinds	20	84				
114	Parisian Poultry Farm	22	68				

CERTIFICATES OF SOUNDNESS.

Certificates of Soundness as under-listed were issued in the course of August, 1922:—

Name of Stallion.	Breed.	Period for which Certificate issued.	Owner's Name.	Owner's Address.
Pride of Glenore	Clydesdale ..	Life ..	H. Kilvington..	Glenore Grove, Forest Hill
Baron Windemere	Clydesdale ..	12 months	G. Elliot ..	Laidley
Statesman ..	Clydesdale ..	12 months	G. Elliot ..	Laidley
Crystal River	Clydesdale ..	12 months	S. E. Pullen ..	Prairie Plain, Wyalla
Paddington ..	Blood ..	Life ..	Queensland Government	Dillalah State Station
Soldiers March	Blood ..	Life ..	E. Bagley ..	Chester Street, Valley
Salopian ..	Blood ..	Life ..	Duncan Bros. ...	Childers
Ercanil ..	Blood ..	Life ..	Hon. A. H. Whittingham	Brisbane
The Joker ..	Trotting ..	Life ..	J. E. Moore ..	Maryborough
King Bells ..	Trotting ..	Life ..	R. Cocks ..	Sherwood Road, Toowoong
Tom Holmes..	Trotting ..	Life ..	A. W. Baulch ..	Bald Hills
Bonnie Lad ..	Pony ..	12 months	F. Tucker ..	Sale Yards, Newmarket
Ludo ..	Pony ..	12 months	E. Pocock ..	Palmer Street, Windsor
Little Harold	Pony ..	12 months	G. E. Jackson ..	Eagle Street, Brisbane
Bonny ..	Pony ..	12 months	E. A. Taylor ..	Nudgee

ORGANISATION OF THE AGRICULTURAL INDUSTRY.

The Queensland Producers' Association.

A Record of Progress and Achievement.

The last Regular Meeting of the Council of Agriculture was held in the Council Room, Teachers' Training College Building, Turbot street, Brisbane, on Friday, 25th August, 1922. Subjoined is a complete record of Proceedings covering many matters of first importance to the Farming Industry.

Attendance.—

The Vice President (Mr. J. Purcell) was in the chair; and there were also present Messrs. J. W. Davidson, E. Graham, W. J. Short, H. C. Quodling, and J. D. Story (Administration); Messrs. J. E. Dean, W. Purcell, T. Flood Plunkett, H. Keefor, and J. T. Tod (Dairy Industry); Messrs. S. C. Howe, W. Ranger, H. I. H. Ross, and F. M. Runkin (Fruit Interests); Messrs. G. Batehlor, C. V. Hives, T. A. Powell, and C. H. Pritchard (Sugar Industry); and Messrs. T. Muir and R. Swan (Wheat Growers).

The Council passed the following resolutions:—

1. *Cold Stores at Hamilton—*

That the Chairman of the Dairy Committee and the Chairman of the Fruit Committee be advised to keep in touch as far as possible with the progress of the work in connection with the Cold Stores at Hamilton, so as to ensure that the accommodation promised by December next will be completed by that time.

2. *Standards for Apples—*

That the Department of Agriculture be advised that as a result of the recent National Conference held in Melbourne it is proposed to revise the Customs Regulations dealing with certain standards; and that in the circumstances the Department be asked to defer for the present further action in regard to the recommendations recently submitted by the Council of Agriculture respecting standards for apples.

3. *Railways Rates for Fertilisers—*

That the report made orally at this meeting by Mr. J. W. Davidson to the effect that a reduction of 25 per cent. will be made in the Queensland rates for distances over 200 miles, but not less than the present rate for 200 miles, be noted with an expression of the Council's appreciation of the action taken by the Railway Department in this matter.

4. *Railway Freight on Fruit Consignments.*

That the communication dated the 14th August, 1922, from the Secretary to the Commissioner for Railways be referred to the Fruit Committee for their information.

5. *Banana Pool Ballot—*

That the Under Secretary, Department of Agriculture and Stock, be advised that in view of the circumstances mentioned in Mr. Ross's memorandum of the 17th August, 1922, the Council concurs in the suggestion that a further ballot should be taken as indicated in the memorandum.

6. *Designation of Organisers—*

That it be a recommendation that the designation "Provisional Organiser" be changed to "District Agent."

7. *Appointment of Mr. Allan McKinlay—*

That Mr. Allan McKinlay be appointed as District Agent for District No. 13A, in the room of Mr. Harris, resigned.

8. *Bad Roads, Woombye District—*

- (a) That a copy of the particulars received by the Chairman of the Administrative Committee from the Chairman, Main Roads Board, be sent to the Secretary, Local Producers' Association, Woombye.
- (b) That a copy of the particulars received from the Local Producers' Association, of Woombye, in regard to the above matter, together with a copy of the details furnished by the Chairman of the Main Roads Board, be sent on to the Under Secretary, Home Department, for consideration in connection with any amendment of the Local Authorities Act which that department may have in contemplation.
- (c) That the "Weight of Load" Regulations under the Main Roads Act be brought under the notice of the Transport Committee for consideration and recommendation to the Council in regard to any amendment which, in the opinion of the Committee, should be made in the Regulations in question.

9. *Telephone Service—*

That in regard to the application made to the Deputy Postmaster-General for the connection of the offices of the Council of Agriculture with the Central Telephone Exchange, the Deputy Postmaster-General be again communicated with and asked that, having regard to the public importance of the work which is being undertaken by the Council and to the difficulties which are being experienced in not having a telephone installed, he will be so good as to arrange to treat the application as urgent and to have the telephone installed as soon as the first line is available.

10. *Labour for Cotton Picking—*

- (a) That the correspondence which has taken place between the Chairman of the Administrative Committee and the Director of Labour in regard to the above matter be noted.
- (b) That a copy of the letter dated the 14th August, 1922, received by Mr. Story from the Director of Labour, be sent to the Wondai Chamber of Commerce, with a suggestion that should the Association desire to avail itself of the services of the Department of Labour, the Association communicate direct with the Director.

11. *State Sawmills, Amiens: Case Timber—*

- (a) That the recent letter suggesting that the State Sawmill at Amiens be reopened for the purpose of cutting timber for fruit-case purposes be received and sent on to the Fruit Committee for consideration.
- (b) That a copy of the letter in question be also forwarded to the Director of Forests for the information and consideration of that Department.

12. *Primary Producers' Organisation Act—*

That the recommendations of the Administrative Committee, as contained in Schedule 1 hereto, be approved and that the necessary further action be taken thereon.

13. *Constitution of District Councils—*

- (a) That the number of District Councillors for each district be nine.
- (b) That the ballot for the election of District Councillors be conducted on a sectional basis; that is to say—
 - (i.) That the registered producers in the nineteen districts be classified according to the section of the agricultural industry in which they are engaged, namely—
 - Dairying;
 - Fruitgrowing;
 - General Agriculture;
 - Sugar-growing.
 - (ii.) That the proportion of the nine Councillors to be allocated to the particular section of the industry be determined by the registered number of producers in that section as on 30th November, 1922.

- (iii.) That in the case of ballots the producers in each section of the industry vote only for the persons nominated in that section—thus—

Dairymen shall vote only for the persons nominated for the Dairying Section;

Fruit-growers shall vote only for the persons nominated for the Fruit Section;

General Agriculturists shall vote only for the persons nominated in the General Agricultural Section; and

Sugar-growers shall vote only for the persons nominated in the Sugar Section.

- (c) That each Local Producers' Association name not later than 30th November, 1922, the place which it desires to be the headquarters of its District Council.
- (d) That in the event of more than one place being named as the headquarters of a particular District Council, a ballot of the registered producers in that district be taken to determine the headquarters; such ballot to be taken at the same time as the ballot for the District Councillors or at such other time as the Council of Agriculture may determine.

14. *Chairman, Dairying Committee—*

That it is noted that Mr. E. Graham has been elected as Chairman of the Dairying Committee.

15. *Question of Erection of a New Butter Factory at Rockhampton—*

That the report submitted by Messrs. Graham and Harris on their recent visit to Rockhampton for the purpose of attempting to bring about a reconciliation between the Directors of the Rockhampton Co-operative Company and the Provisional Directors of the Central District Co-operative Company be received, and that the particulars contained therein be noted.

16. *Pasteurisation of Milk and Cream—*

- (a) That it is noted that the Dairy Committee is strongly of opinion that the installation of pasteurisers in Queensland factories, where necessary, would effect a general improvement in the quality of butter and cheese produced.
- (b) That suitable particulars relating to this matter be embodied in the next Bulletin to be issued by the Council.
- (c) That the particulars be brought suitably under the notice of the secretaries of the Co-operative Dairy Companies and Cheese Manufacturers' Associations, and that their co-operation and assistance be invited.
- (d) That the several establishments which have kindly supplied the Committee with information respecting pasteurisers be suitably thanked and advised, at the same time, of the action taken by the Council.
- (e) That further information regarding the cost of installation of the complete pasteurising plant (cooler, pump, &c.) be obtained from A. J. Dutch, Wellington, New Zealand.

17. *Co-operative Companies Bill—*

- (a) That the report of the proceedings of the conference held to discuss suggestions for possible inclusion in the proposed Co-operative Companies Bill be received.
- (b) That the Council endorse the resolution carried by the conference regarding the appointment by the Council of a special committee to report on the matter.
- (c) That the several members of the Administrative Committee be appointed as a select committee to go thoroughly into this question with officers of the Crown Law Department.

18. *Herd Testing—*

- (a) That the Council defer action in regard to the adoption of any definite scheme until after the arrival of the Director.
- (b) That the Director confer with the Dairy Standing Committee and the Director of Dairying, with a view to the preparation of a concrete scheme to be submitted by the Council to the District Councils and Local Producers' Associations.

- (c) That such scheme embody provisions for securing the support of dairy-men, their compliance with prescribed rules and the financing of the scheme by a levy to be made and applied for the specific purpose of herd-testing in accordance with the regulations to be made under Section 14 of the Primary Producers' Organisation Act "for the expenditure of sums raised by any particular levy only in the interests of the particular industry or section of industry in which such levies were made."

19. *Complaint regarding Slaughtering Act*—

That in connection with the statements contained in a recent report received from Organiser McMaster regarding the above question, he be furnished with a copy of the particulars obtained from the Department of Agriculture and Stock as set out in the Under Secretary's letter of the 11th August, 1922.

20. *Jersey Breed at Warren State Farm*—

That in connection with the request contained in a letter received recently from the Milman Local Producers' Association, urging the establishment of a breed of Jersey cattle at Warren State Farm, the Association be suitably communicated with on the lines suggested by the Dairy Committee.

21. *Factory Returns relating to Low-Grade Cream*—

That the letter dated the 1st August, 1922, from the Department of Agriculture and Stock be received, and that in view of the circumstances mentioned therein the present system be given a further six-months' trial.

22. *Dairy Inspectors and Instructors*—

- (a) That it is noted that in the Estimates for the financial year 1922-23 provision has been made for the following additional appointments, namely:—An Assistant Dairy Expert, a Dairy Instructor, a Dairy Inspector, and two Herd-testers.
- (b) That the Department of Agriculture be requested to take such action as will ensure the regular inspection of dairying premises.

23. *Facilities for Marketing of Pigs*—

- (a) That it is noted that the Dairy Committee is in accord with the principles underlying the suggestions contained in a recent letter from Mr. Wight.
- (b) That before any further action is taken in this matter the views of pig-producers be obtained as far as practicable.
- (c) That with a view to obtaining the information referred to in (b) above, the matter be brought suitably under the notice of the District Agents and the Local Producers' Associations in districts and localities where pigs are produced.

24. *Question of Regrading of Australian Butter, &c.*—

That in connection with the Resolutions submitted by the Canaga Local Producers' Association regarding—

- (a) The regrading, standardising, and branding of Australian butter at place of import;
- (b) The overcoming of competitive antagonism in the marketing of Australian butter overseas; and
- (c) The standardising of first-class butter by Government experts;

the Association be informed that (a) and (c) are matters for determination by the Commonwealth Government as a result of the recent agreement arrived at between the Commonwealth and the States; and that though in accord with the principle underlying (b) the Committee is not in a position at present to take any further action.

25. *Stabilisation of Prices.*—

- (a) That the information contained in a wire dated 15th August, 1922, received from Mr. Owens (Commonwealth Dairy Pool), regarding the present position in Victoria, is noted with satisfaction.
- (b) That the matter be brought up again for discussion on receipt of the further particulars promised by Mr. Owens.

26. *Improving Cultural Methods of Wheat Growing—*

That it is noted that in accordance with the proposals contained in the report submitted to the Council in May last, the whole of the stocks of selected wheats held by the Department of Agriculture were acquired by the Wheat Board and disposed of to growers upon specified conditions; and that reports to hand show that germination has been good.

27. *Maize Pool—*

- (a) That the Department of Agriculture be requested to furnish as soon as possible, for the information of the Council, particulars in regard to the result of the ballot taken recently by the Department in regard to a Maize Pool.
- (b) That the Director be requested to obtain, while in Victoria, such particulars as he may be able to secure in regard to the manufacture (by the Maize Products Company at Footscray, Victoria) of glucose, starch, and other by-products of maize.

28. *Wheat Board Election—*

- (a) That it is noted that in the opinion of the Wheat and General Agriculture Committee it is desirable that the tenure of office of the members of the Wheat Board to be elected in November next should be two years.
- (b) That the Department of Agriculture be advised accordingly.

29. *Export of Eggs—*

- (a) That the recent letter from the Department of Agriculture and Stock covering copy of a communication from the Soldiers' Settlement Branch of the Lands Department, regarding the glut season for eggs and the desirability of organising an export trade, be acknowledged with an intimation that the matter is under consideration.
- (b) That the South Australian Farmers' Union be communicated with in suitable terms, with a view to the obtaining from that body details of any scheme which it may have in operation regarding this matter: a copy of the letter to be sent to Mr. Macgregor for his information and for such action as it may be conveniently possible for him to take thereon when passing through Adelaide.
- (c) That the Department of Trade and Customs be asked for:—
 - (i.) A copy of the regulations, if any, made under the Customs Act to bring about uniformity in regard to quality and size of eggs for export;
 - (ii.) Statistics in regard to eggs imported to or exported from Australia;
 - (iii.) Such further helpful particulars as the Department may be able to supply in regard to markets for eggs, egg-pulp, &c.
- (d) That the views of the Brisbane Poultry Associations be ascertained generally on the question of promoting an export trade for eggs.

30. *Fertilisers—*

- (a) That the letter dated the 8th August, 1922, from the Commissioner of Prices be received, and that the further consideration thereof be deferred pending action by the Commissioner as indicated in the concluding paragraph of his letter.
- (b) That in the meantime the Agricultural Chemist be requested (through the Under Secretary, Department of Agriculture and Stock) to explain the method of determining the unit value of fertilisers and the most suitable means to be employed in disseminating the information to growers.
- (c) That the Department of Agriculture be asked for full information in regard to the present system of testing fertilisers.

31. *Agricultural Machinery—*

- (a) That inquiry be made from the South Australian Farmers' Union as to the system employed by them in regard to the indenting of agricultural machinery and the sale thereof to the individual farmers; a copy of this letter to be sent to Mr. Macgregor for his information and for such action as it may be conveniently possible for him to take thereon when passing through Adelaide.
- (b) That inquiries be made also from New Zealand and Southern manufacturing firms respecting this matter.
- (c) That the further consideration of the matter be then deferred until the Director arrives and he can be consulted thereon.

32. *African Maize—*

- (a) That the wire dated the 11th August, 1922, from the Secretary, Local Producers' Association, at Atherton, asking the Council to urge the Minister for Customs to arrange for an immediate increase of three shillings cental duty on African maize, be received and transmitted to the Tariff Board, Melbourne, with an intimation that it is the opinion of this Council that, as Australia can produce sufficient maize under normal conditions for all Australian requirements, the request should be favourably considered.
- (b) That inquiry be made at the same time as to the steps, if any, already taken by the Board in the matter.

33. *Question of Protection for Coffee-growers—*

- (a) That the letter dated the 15th August, 1922, from the Secretary, Buderim Progress Association, intimating that unless some further protection is given to Queensland coffee-growers the industry must die out owing to the small prices obtainable at present for this commodity, be acknowledged with an intimation that inquiries are being made into the matter; the Secretary to be requested at the same time to furnish particulars as to the quantity of coffee produced at present by the growers to whom he refers.
- (b) That a copy of the letter referred to above be sent to the Tariff Board, Melbourne; and that the Board be requested to furnish particulars as to—
 - (i.) The duty, if any, on coffee imported to Australia;
 - (ii.) The annual quantity produced in Australia at present;
 - (iii.) The annual consumption at present.
- (c) That a copy of the letter be sent also to the Federal Member for the Lilley Division (*i.e.*, the Federal Electoral Division comprising the area mentioned in (a) above).

34. *Scheme for Improving Horses, &c.—*

- (a) That the letter from the Under Secretary, Department of Agriculture and Stock, covering a scheme for the improvement of types of horses in Queensland, be received and acknowledged with an intimation that in the opinion of this Council all possible measures should be taken to produce good types of reliable horses suitable not only for use in Queensland but also for export to other countries.
- (b) That this Council is also of opinion that a stallion tax should be imposed, and that the inspection and approval of mares is also desirable.

35. *Co-operative Purchasing of Stallions, Bulls, &c. —*

That the Council urge the Government to encourage and to assist as far as practicable in the co-operative purchasing, where necessary, of approved stallions, bulls (beef and dairy), rams, and boars.

36. *Minimum Load of Butter in Iced Wagons—*

That the following circumstances be noted:—

- (a) The butter wagons which are capable of carrying up to 8 tons of butter are hauled to the factories empty; and a reduction of the minimum load from 3 to 2 tons would mean haulage of very lightly loaded vehicles;
- (b) That there should be no difficulty in forwarding small loads of butter in louvered wagons during the winter, and that during the summer months, as factories are usually able to make up a minimum load of 3 tons, no serious difficulty should be experienced except, perhaps, in drought time, when the circumstances could be brought up for further consideration.

37. *Question of Motor Road Transport, Remote Localities—*

That it is noted that in the opinion of the Transport Committee this matter (arising out of a communication from Mr. C. H. Annesley, Cunnewin, *viâ* Roma, in which he intimates that he would be prepared to establish a motor transport service in any remote locality offering fair prospects of building up a successful business) is not one for its attention.

38. *Preferential Rates—Rural Industrial—*

That in connection with the reference from the Woombye Local Producers' Association:—

“To foster the establishment of rural industries, differential rates in favour of manufactured articles sent to port should be granted on the railways, and also the necessary essential requirements, such as tinned plate, sugar, cases, &c.,”

it is noted that the Transport Committee is of the opinion that this request has apparently been made without a full knowledge of the fact that jam, jellies, marmalade, preserved fruits, and fruit-pulp all obtain special low rates to port, and that sugar to jam factories, case timber, and tinplate, “B” class, are also chargeable at special cheap rates.

THE PRIMARY PRODUCERS' ORGANISATION ACT.

ITS PROVISIONS REVIEWED.

By “*The Primary Producers' Organisation Act of 1922*” the Queensland Producers' Association, made up of the Council of Agriculture, District Councils, and Local Producers' Associations, is now statutorily established, and its functions, powers, authorities, duties, and responsibilities are fully set out by parliamentary authority.

Council of Agriculture.

The Council of Agriculture, which is really the executive body of the Queensland Producers' Association, is now incorporated and has been constituted as follows:—

- (a) The number of members of the Council shall be the number from time to time declared by the Governor in Council by Order in Council, but shall not exceed twenty-five at any one time.
- (b) Not less than five members nor more than one-fourth of the total number of members shall be appointed by the Governor in Council as the representatives of the Government.

The Minister shall by virtue of his office be a member of the Council and shall be deemed to have been appointed by the Governor in Council as one of the said representatives of the Government.

- (c) The remaining members, of whom there shall be not less than fifteen, shall be elected by the district councils.

Each district council shall elect one member in the prescribed manner to be the representative of such district council.

- (d) All such representatives (other than the Minister) shall hold office only for a term declared by the Governor in Council by Order in Council, but not exceeding three years, and shall be eligible for reappointment or re-election, as the case may be.
- (e) Any person who has his affairs under liquidation, or is an uncertificated or undischarged insolvent, or has been convicted of an indictable offence, or is undergoing a sentence of imprisonment, or becomes an insane person, shall be disqualified from being appointed or elected or from continuing a member of the Council.

The First President.

The Minister for Agriculture shall, by virtue of his office, be the President of the Council. The Hon. W. N. Gillies is, therefore, the first President of the Queensland Producers' Association.

Vacancies.

Full provision has been made for filling vacancies on the Council in the most democratic way possible. The appointment of a Director and a capable staff has also been provided for.

Functions and Objects of the Council.

The functions and objects of the Council shall be to co-operate with the Department, district councils, local associations, and other bodies and persons in—

- (i.) Developing the rural industries;
- (ii.) Effecting the stabilisation of prices of primary produce for the purpose of ensuring to the primary producer a fair remuneration for his labour;
- (iii.) Investigating and dealing with problems relating to the rural industries including animal husbandry;
- (iv.) Advising and instructing primary producers with regard to matters which require scientific knowledge and training, farm management and farm economics, including cost of production and farm accountancy;
- (v.) Making research on subjects pertaining to the rural industries;
- (vi.) Securing effective action for the controlling of diseases and pests generally;
- (vii.) Securing additional markets for the disposal of produce and improved means of distribution;
- (viii.) Studying markets; accumulating data regarding marketing processes and costs; disseminating accurate market information; and eliminating waste and unnecessary marketing expenses;
- (ix.) Securing improved means of storage, handling, and transport;
- (x.) Promoting a general policy of testing, standardising, and grading;
- (xi.) Extending the usefulness of the professional staff of the Department by the utilisation of experts, the dissemination of literature and pamphlets dealing with matters of interest to primary producers, and by any other method which the Council thinks fit, including the establishment of a Bureau of Information for primary producers;
- (xii.) Encouraging and assisting in the promotion of farmers' co-operative associations and enterprises;
- (xiii.) Bettering the conditions of rural life and the extending rural education by co-operation with the educational authorities of the State and generally;
- (xiv.) Dealing with matters in relating to agriculture and production of primary produce which may be referred to the Council by the Minister;
- (xv.) Generally advising, assisting, and co-operating with the Department and the Associations in all matters pertaining to the rural industries; where deemed necessary, convening conferences;
- (xvi.) Making research on the subject of the utilisation of rural products in manufactories; co-ordinating and assisting in the promotion of such industries by the extension of the Bureau of Information, and, where necessary, convening conferences for this purpose.

The Provisional Council.

The Provisional Council of Agriculture appointed by the Governor in Council, now in existence, is deemed to have been constituted as the Council of Agriculture under the Act, and its members shall hold office until the appointment or election of a Council of Agriculture in the manner prescribed, but in no case shall any member of the Council or any provisional district council continue in office after the 24th March, 1923.

District Councils.

For the purposes of efficient organisation, provision is made for the establishment of Districts within defined boundaries.

For each District a district council shall be constituted, the members of which shall be elected by members of local producers' associations for a term not longer than three years.

Duties and Functions of a District Council.

The duties and functions of a district council shall be—

- (i.) To secure co-operation as far as possible amongst the primary producers who are members of local associations assigned to the District;
- (ii.) To advise and assist the Council in developing schemes in regard to the production, marketing, grading, and standardisation of primary produce, or for making more effective use of the experts and facilities of the Department;
- (iii.) To advise and assist the Council in such matters as co-operation in the purchasing of machinery, fertilisers, and other articles employed in primary production, promotion of herd-testing, fodder conservation, and the circulation among primary producers of information and advice on primary production generally; and
- (iv.) Such other duties and functions as the Council may determine.

The Council of Agriculture may assist, monetarily, district councils by grants from the Fund for the creation of which statutory authority is given.

Local Producers' Associations.

Where at least fifteen primary producers in any centre desire it and make the prescribed application to the Council of Agriculture, a local producers' association may be formed. Every man obtaining his living directly from the soil is entitled to enrolment in a local association, but he may only belong to one such body, and may not become a member of two or more local associations.

Duties and Functions of Local Producers' Associations.

The duties and functions of local associations include—

- (i.) Taking the initiative in rural matters pertaining to the particular locality in which the associations primarily interested;
- (ii.) Ascertaining the requirements of such locality and formulating schemes for having these requirements met;
- (iii.) Bringing before the district council, through the local association's representative, requirements and problems which are not of purely local concern, but are of common interest and concern;
- (iv.) Advising, supporting, and assisting the district council in its efforts to promote the general prosperity of the primary producers;
- (v.) Generally co-operating with, advising, and assisting the district council in enabling it to discharge its duties and functions efficiently;
- (vi.) Endeavouring to co-ordinate and correlate the work of the local associations, progress associations, and other like societies in the District, and to strengthen the work they are doing in so far as it relates to the rural industries.

Queensland Producers' Association Fund.

The Act makes provision for the establishment of the Queensland Producers' Association Fund, to which will be charged all expenses incurred by the Council in carrying out its functions. The Council will administer this Fund, which will be subject to regular audit by officers of the Department of the Auditor-General.

All levies made by the Council as prescribed, and all fines for non-payment, shall be paid into the Fund.

During a period of five years from the date of the passing of the Act, the Governor in Council shall make grants in aid of the Fund out of Parliamentary appropriations for that purpose, and every such grant shall be at a rate of not less than £1 for every £1 paid into the Fund during the twelve months preceding such grant in respect of all levies and fines imposed under the Act.

Regulations for the control and management of the Fund are set out in the Act.

Levies.

The Act provides that before any levy is made on the primary producers in any industry, at the request in writing of at least one hundred primary producers in that industry a poll of such primary producers shall be held, and if upon such poll the majority of votes is against the making of such levy, no such levy shall be made upon the primary producers in that industry.

Rules Governing Proceedings.

Rules governing proceedings and business of the Council of Agriculture, district councils, and local producers' associations are set out fully in the Schedule of the Act.

What is a Primary Producer?

The definition of the term "primary producer" is set out clearly in the Act as follows:—

"Primary producer"—Every person, not being a person engaged in primary production as an employee on wages or piecework rates, engaged in the occupation of—

- (a) Dairy farmer; or
- (b) Wheat maize or cereal grower; or
- (c) Cane-grower; or
- (d) Fruit-grower; or
- (e) Grazier; or
- (f) Farmer, whether engaged in general or mixed farming, cotton potato or vegetable growing, or poultry or pig-raising; and

any class of persons, not being persons engaged in primary production as employees on wages or piecework rates, declared by the Governor in Council, on the recommendation of the Council, by Order in Council, to be primary producers for the purposes of this Act; and "primary produce" and "primary production" have correlative meanings.

BURNETT CANE CROP PROSPECTS.

Reporting on the cane crops in the Bundaberg, Isis, and Maryborough sugar areas, the Director of Sugar Experiment Stations, who recently returned from a brief visit to these places, said that although the cane was backward, due to the long spell of dry weather during the autumn months, the recent good falls of rain in July had much improved the prospects, with the exception of the standover cane, and the mills are now expecting to harvest more cane than was estimated six weeks ago. Some frosts have occurred, but these have done no serious damage, and if the remainder of the winter is mild and further rains fall there is plenty of time during the crushing season for the crops to still further improve. The sugar content in the cane is very fair to good at present, and farmers generally are well satisfied. The mills are working smoothly and the improvements made during the slack season are giving good results. The Isis Central mill has been brought up to date by the installation of a new 10-ton pan, a large extra effet, a fine spray system in place of the old water tower, new Edwards dry-air pump of special design, new duplex reciprocal pump, and centrifugal pumps. These improvements have been made under the supervision of the manager, Mr. J. Alison. Doolbi mill has also had new machinery installed, and a number of ingenious automatic devices at various stations are saving labour and regulating deliveries. These are principally the invention of the manager, Mr. G. Francis, who was assisted in some particulars by the mill overseer, Mr. G. Stevenson. The three mills in the district expect to treat about 170,000 tons of cane, and it is anticipated that another 30,000 tons will go to Fairymead.

The cane about Maryborough has also improved, though there is not so much grown now as there should be.

The cane at the Sugar Experiment Station, Bundaberg, was looking well. One of the more-recently introduced varieties, known as E.K.1, from Java, is of great promise. So far it has proved a fine ratooner and a good standover cane. Its commercial sugar content is good also, and it is attracting much attention from visiting farmers.

Editorial Notes.

Co-operative Butter Selling.

Variations in angles of sight of the directorate of one of our leading co-operative dairy companies in respect to co-operative selling, as expressed at a recent meeting, will not discourage the student of co-operative development. The conditions that must prevail and the fundamental principles essential for acceptance before any co-operative marketing system that is likely to endure can be established were not discussed at the meeting referred to, yet their consideration was important to its purpose and much needed, for the divergent viewpoints are rooted in them. Farmers in every country, when they first resort to co-operative methods of marketing, usually have to meet with bitter and often unscrupulous opposition from the interests that previously handled their produce. In the face of such opposition no amount of devoted effort or unstinted thought will bring success to co-operation unless the previous conditions were such as to present striking evidence of the benefits to be derived from combined, regulated, and forcefully directed effort. Hence we have a well-established principle in co-operative marketing that, unless at the time of organisation conditions are so satisfactory that immediate benefits are assured early in the life of the co-operative organisation, the concern is likely to suffer from inertia or succumb to attacks from outside interests. Experience teaches that co-operative marketing can only be readily established when conditions are such that the need of improvement is generally apparent to those engaged as producers in the industry affected. When they are otherwise, the well-meant efforts of promoters are more likely to hinder than to help the industry concerned. When prices are below cost and farmers are actually paying money in addition to their commodity for the privilege of marketing their output, co-operative selling can be readily incepted. Not until vignerons fed raisins to their horses were the fruitgrowers of California ready to organise the selling end of their business.

The principle that selling organisations must be composed of persons whose interests are similar is generally accepted by co-operators; and experience has shown that membership of sales organisations should usually be limited to actual producers. All attempts hitherto made to combine in one organisation the interests of producers and dealers or packers have demonstrated the incompatibility of such an arrangement. Many instances of their failure might be quoted. Combinations of this character for a while look as though they were the solution of every marketing problem. Success may be apparent for a time, yet, as a rule, the life of every such hybrid agency is brief and fitful. Conflicting interests and the grievances and jealousies they engender are usually the disintegrating causes. The outstanding factor of all success in co-operative effort is the loyalty of individual members. Other of the main contributing quantities are mutual confidence, sound economics, a common-sense knowledge of human nature, and fair dealing. All these elements are absolutely essential to the permanent success of co-operative enterprise, especially in a marketing organisation.

Underlying the clash of ideas at the meeting referred to, the will and determination to co-operate completely were evident, and in revealing this a big service to the dairying industry was done. And the meeting did even more, by focussing thought on its selling difficulties and clearing the ground for the extension of its co-operative enterprise. The difficulties expressed and appraised are not new. In other countries they have been encountered and overcome, and at this juncture it is a wise thing to survey, and, if possible, profit by the experience of co-operators in either Denmark or Germany.

In the countries named fully 90 per cent. of all dairies are attached to central organisations, which serve their common as distinct from their particular business objects. Such bodies are called unions, the main purpose of which is to undertake the audit and inspection of their affiliated societies. Besides this, they act in general as intelligent organisers and regulators of co-operative effort. These unions possess no purely business functions; their legal status is that of a registered association, which implies that they do not carry on any profit-making business. Membership does not involve any liability. Apart from audit and inspection, these unions undertake propaganda and advisory work. Their articles expressly state that the independence, internal economy, and administration of their affiliated societies shall in no way be interfered with as the result of their association in the union. Over 90 per cent. of dairies in Germany are audited by auditors appointed by these unions. This examination is not merely an accountancy audit, but rather a general audit and inspection of all the circumstances of a dairy. Experience favours audit by unions, for the specialists appointed are professional co-operators whose interests and lifework are linked with co-operation, and who are concerned in the lifting of the level of good management. With our dairy companies linked up in an audit union the reports of its auditors would furnish convincing evidence on commercial matters, as is evident from the proceedings of the meeting referred to, now receiving the close attention of co-operators, and should prove a satisfactory means of eliciting the data needed for influencing sound and timely business decisions.

Event and Comment.

The Cotton Guarantee.

In the course of his Budget Speech, the Treasurer (Hon. E. G. Theodore) made the following statement on the subject of the guarantee to cotton-growers:—

“Already cotton-growing has been greatly stimulated in this State by the action of the Government in guaranteeing to the growers 5½d. per lb. for all seed cotton of approved quality grown by them. This guarantee was for three years ending 30th June, 1923. In order to still further encourage the planting of cotton, the Government has decided to extend the existing guarantee until 31st July, 1923—that is, by one month—to enable the cotton-growers to reap the advantage of the guaranteed price of 5½d. per lb. for the whole of the forthcoming crop, which ought to be harvested by the extended date. It is intended also to guarantee a price for a further period of three years ending 31st July, 1926. The conditions under the new guarantee will be different to those ruling at present, as the price will be based on the quality and length of staple of the cotton. The details have not yet been worked out, but for the first year of the new guarantee period the maximum price will be 5½d. per lb. for seed cotton of one and a-quarter inch staple, of good quality and free from disease. In 1920 the Government entered into an agreement with the British Cotton Growers' Association (a body mainly comprising Lancashire cotton manufacturers), under which the Association guaranteed for cotton grown in Queensland the price of 1s. 6d. per lb. of clean lint of good quality, c.i.f. Liverpool. The agreement was for five years, but the Association's losses were limited to £10,000. The prices realised for Queensland cotton during 1921 were below the price guaranteed under the agreement, and it will, therefore, be necessary to draw upon the guarantee. Any balance of the £10,000 will be applicable to the 1922 crops, but any loss beyond the amount of the guarantee must be borne by the Queensland Government.”

The Boll-Worm Menace to Queensland Cotton.

“I must emphasise the absolute need for the taking of every precaution to prevent the advent of the boll-worm in our cotton fields,” remarked the Minister for Agriculture and Stock (Hon. W. N. Gillies) in the course of a recent Press interview. Mr. Gillies was speaking on the representations respecting this pest made by the Queensland Government to the Commonwealth authorities, to the Tariff Commissioner, and to the Director-General of Public Health. “The matter,” he said, “was discussed with the Tariff Commission by Messrs. Crawford Vaughan, D. Jones, and the Under Secretary (Mr. E. G. Scriven). Mr. Scriven also saw the Director-General of Health on the subject when recently in Melbourne, the request then made being that the carriage of seed through the post should be prohibited and that Brisbane should be made the only port of entry. Information had now reached him that all seed arriving through the Customs at any port other than Brisbane would be sent for treatment and for examination to Brisbane, where there were officers with special experience in cotton pests and diseases. America's experience with the boll-worm warranted the taking of the strictest precautions by Queensland to maintain her cotton fields free of all disease,” the Minister continued. “The latest advices showed that America this year was suffering very badly from the pest, and though the extent of the damage was not fully known, the ‘Manchester Guardian,’ of 6th July, stated, on information based upon official reports from the United States, that the situation as indicated by a recent report of a crop condition of 71.2 per cent., an acreage of 34,850,000, and a crop of 11,065,000 bales is fraught with danger. The newspaper adds that a report from Georgia asserted that in a section of that State the damage by weevil was 100 per cent., and that a prominent farmer in Texas had computed the presence of the weevil upon his farm at the rate of 5,000 to the acre.

“This knowledge gave additional emphasis to the need for preventing the introduction of seed from America or any other source similarly affected, unless under the most stringent conditions of treatment. The interest in cotton cultivation in Australia was not confined to Queensland, but the residents of the Southern States had not had the experience of Queensland growers, and therein rested the danger—the possibility of affected seed being admitted at southern ports where those interested in the examination at the time of entry had not the knowledge and experience of the pests of cotton as are possessed by the Queensland Government Entomologist (Mr. H. Tryon). There had also existed the danger of seed being carried through the post, and only lately it was necessary to search for a parcel that had passed through the post without being noticed. Fortunately the seed was found before it was planted. It was now in quarantine.”

General Notes.

TO CORRESPONDENTS.

To avoid delay in answering a number of questions on agricultural and kindred subjects, replies have been sent by post. The replies of general interest to farmers will be published in the Journal in due course.

CASSABA MELON SEEDS.

A number of requests have been received for cassaba seeds. As only last season's seeds are now on hand, we should like some grower who benefited by last year's distribution and who retained seed from the resultant crop for this year's sowing, to kindly supply a small parcel to enable us to meet these requests with new seed.

Farm and Garden Notes for October.

FIELD.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds goods with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, sorghum, setaria, imphee, panicum, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, tumeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred.

KITCHEN GARDEN.—Our notes for this month will not vary much from those for September. Sowings may be made of most vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascan beans should also be sown. Sow the dwarf Lima beans in rows 3 ft. apart with 18 in. between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the plants will be drawn and worthless. Thin out melon and cucumber plants. Spraying for fungoid diseases should be attended to, particularly all members of the *Cucurbitaceae* and *Solanum* families, of which melons and tomatoes are representative examples. Give plenty of water and mulch tomato plants planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

FLOWER GARDEN.—The flower garden will now be showing the result of the care bestowed upon it during the past two months. The principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant tuberoses, crinum, ismene, amaryllis, paneratum, hermocallis, hippeastrum, dahlias, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphids, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.

Orchard Notes for October.

THE COAST DISTRICTS.

October is frequently a dry month over the greater part of Queensland, consequently the advice that has been given in the notes for August and September regarding the necessity of thorough cultivation to retain moisture is again emphasised, as, unless there is an adequate supply of moisture in the soil to meet the trees' requirements, the coming season's crop will be jeopardised, as the young fruit will fail to set.

Thorough cultivation of all orchards, vineyards, and plantations is therefore imperative if the weather is dry, as the soil must be kept in a state of perfect tilth, and no weeds of any kind must be allowed to grow, as they only act as pumps to draw out the moisture from the soil that is required by the trees or fruit-yielding plants. Should the trees show the slightest sign of the want of moisture, they should be given a thorough irrigation if there is any available means of doing so, as it is unwise to allow any fruit trees to suffer for want of water if there is a possibility of their being supplied with same. Intermittent growth, resulting from the tree or plant being well supplied with moisture at one time and starved at another, results in serious damage, as the vitality is lessened and the tree or plant is not so well able to ward off disease. A strong, healthy, vigorous tree is frequently able to resist disease, whereas when it has become debilitated through neglect, lack of moisture or plant food, it becomes an easy prey to many pests. If an irrigation is given, see that it is a good one and that the ground is soaked; a mere surface watering is often more or less injurious, as it is apt to encourage a false growth which will not last, and also to bring the feeding roots to the surface, where they are not required, as they only die out with a dry spell and are in the way of cultivation. Irrigation should always be followed by cultivation, so as to prevent surface evaporation and thus retain the moisture in the soil.

All newly planted trees should be carefully attended to, and if they show the slightest sign of scale insects or other pests they should receive attention at once. All growth not necessary to form the future tree should be removed, such as any growths on the main stem or main branches that are not required, as if this is done now it will not only save work later on, but will tend to throw the whole strength of the tree into the production of those limbs that will form the permanent framework of the tree. In older trees all water sprouts or other similar unnecessary growths should be removed.

Keep a good lookout for scales hatching out, and treat them before they have become firmly established and are coated with their protective covering as they are very easily killed in their early stages, and consequently much weaker sprays can be used. The best remedies to use for young scales hatching out are those that kill the insects by coming in contact with them, such as miscible oils, which can be applied at a strength of 1 part of oil in 40 parts of spraying material and will do more good than a winter spray of double the strength. In the use of miscible oils or kerosene emulsion, always follow the directions given for the use of these spraying materials, and never apply them to evergreen trees when they are showing signs of distress resulting from a lack of moisture in the soil, as they are then likely to injure the tree, whereas if the tree is in vigorous growth they will do no harm whatever.

All leaf-eating insects should be kept in check by the use of an arsenate of lead spray, taking care to apply it as soon as the damage appears, and not to wait till the crop is ruined. Crops, such as all kinds of cucurbitious plants, tomatoes, and potatoes are often seriously injured by these insects, and the loss occasioned thereby can be prevented by spraying in time. In the case of tomatoes and potatoes, a

combined spray of Bordeaux or Burgundy mixture and arsenate of lead should be used, as it will serve the dual purpose of destroying leaf-eating insects and of protecting the plants from the attack of Irish blight.

Grape vines require careful attention, and, if not already sprayed with Bordeaux mixture, no time should be lost in applying this material, as the only reliable method of checking such diseases as anthracnose or black spot and downy mildew is to protect the wood and foliage from the attack of these diseases by providing a spray covering that will destroy any spores that may come in contact with them. The planting of bananas and pineapples can be continued during this month. See that the land is properly prepared and that good healthy suckers only are used. Keep the plantations well worked, and allow no weed growth. Keep a very careful lookout for fruit flies; destroy every mature insect you can, and gather and destroy every fallen fruit. If this is done systematically by all growers early in the season, the subsequent crops of flies will be very materially decreased. See that all fruit sent to market during the month is carefully handled, properly graded, and well packed—not topped, but that the sample right through the case or lot is the same as that of the exposed surface.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Much of the matter contained under the heading of "The Coast Districts" applies equally to these parts of the State, as on the spring treatment that the orchard and vineyard receives the succeeding crop of fruit is very largely dependent. All orchards and vineyards must be kept in a state of perfect tilth, and no weed growth of any kind should be allowed. In the Western districts, irrigation should be given whenever necessary, but growers should not depend on irrigation alone, but should combine it with the thorough cultivation of the land so as to form and keep a fine soil mulch that will prevent surface evaporation.

All newly planted trees should be carefully looked after and only permitted to grow the branches required to form the future tree. All others should be removed as soon as they make their appearance. If there is any sign of woolly aphis, peach aphis, or scale insects, or of any fungus diseases on the young trees, these diseases should be dealt with at once by the use of such remedies as black leaf forty, Bordeaux mixture, or a weak oil emulsion. In older trees, similar pests should be systematically fought, as if kept in check at the beginning of the season the crop of fruit will not suffer to any appreciable extent. Where brown rot has been present in previous years, two or more sprayings with Bordeaux mixture can be tried, as they will tend to check other fungus growths, but at the same time the sodium or potassium sulphide sprays are more effectual for this particular disease and should be used in preference when the fruit is nearly full grown. All pear, apple, and quince trees should be sprayed with arsenate of lead—first when the blossom is falling, and at intervals of about three weeks. Spraying for codling moth is compulsory in the fruit district of Stanthorpe, and wherever pomaceous fruits are grown it must be attended to if this insect is to be kept in check.

In the warmer parts a careful watch should be kept for any appearance of the fruit fly, and, should it be found, every effort should be made to trap the mature insect and to gather and destroy any affected fruit. If this is done, there is a good chance of saving the earlier ripening summer fruits, if not the bulk of the crop. Tomato and potato crops will require spraying with Bordeaux mixture, as also will grape vines. Keep a very strict watch on all grape vines, and, if they have not already been treated, don't delay a day in spraying if any sign of an oil spot, the first indication of downy mildew, appears on the top surface of the leaf. Spraying with Bordeaux mixture at once, and following the first spraying up with subsequent sprayings, if necessary, will save the crop, but if this is not done and the season is favourable for the development of the particular fungus causing this disease, growers can rest assured that their grape crop won't take long to harvest.

Where new vineyards have been planted, spraying is also very necessary, as if this is not done the young leaves and growth are apt to be so badly affected that the plant dies.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1922.	JULY.		AUGUST.		SEPTEMBER	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6.45	5.6	6.36	5.20	6.7	5.37
2	6.45	5.6	6.35	5.21	6.6	5.38
3	6.45	5.7	6.35	5.21	6.5	5.38
4	6.45	5.7	6.34	5.22	6.4	5.38
5	6.45	5.8	6.33	5.23	6.3	5.39
6	6.45	5.8	6.32	5.24	6.2	5.39
7	6.45	5.9	6.31	5.24	6.1	5.40
8	6.45	5.9	6.30	5.25	6.0	5.40
9	6.44	5.10	6.29	5.26	5.58	5.41
10	6.44	5.10	6.28	5.27	5.57	5.41
11	6.44	5.10	6.28	5.28	5.56	5.42
12	6.44	5.11	6.27	5.28	5.55	5.42
13	6.43	5.11	6.26	5.29	5.53	5.43
14	6.43	5.12	6.25	5.29	5.52	5.44
15	6.43	5.12	6.24	5.30	5.51	5.45
16	6.42	5.13	6.23	5.30	5.50	5.45
17	6.42	5.13	6.22	5.31	5.49	5.46
18	6.42	5.14	6.21	5.31	5.48	5.46
19	6.41	5.14	6.21	5.32	5.47	5.46
20	6.41	5.15	6.20	5.32	5.46	5.46
21	6.41	5.15	6.19	5.32	5.44	5.46
22	6.40	5.16	6.18	5.33	5.43	5.47
23	6.40	5.16	6.17	5.33	5.42	5.47
24	6.39	5.17	6.16	5.34	5.41	5.47
25	6.39	5.17	6.15	5.34	5.40	5.48
26	6.38	5.18	6.14	5.35	5.39	5.48
27	6.38	5.18	6.13	5.35	5.38	5.49
28	6.37	5.19	6.12	5.36	5.37	5.49
29	6.37	5.19	6.11	5.36	5.36	5.50
30	6.36	5.20	6.10	5.37	5.35	5.50
31	6.36	5.20	6.9	5.37	...	...

PHASES OF THE MOON, OCCULTATIONS, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer Time" is not used.

		H. M.
2 July	(First Quarter	8 52 a.m.
9 "	○ Full Moon	1 7 p.m.
17 "	☾ Last Quarter	3 11 p.m.
24 "	☾ New Moon	10 47 p.m.
31 "	(First Quarter	2 22 p.m.

Apogee on the 15th at 3.24 a.m.

Perigee on the 27th at 1.30 a.m.

About 8 o'clock in the evening of 29th July the apparent nearness of the Moon and the giant planet Jupiter low down in the west will form a very interesting spectacle; there will be an occultation of Jupiter about 9 o'clock.

8 Aug.	○ Full Moon	2 19 a.m.
16 "	☾ Last Quarter	6 46 a.m.
23 "	☾ New Moon	6 34 a.m.
29 "	(First Quarter	9 55 p.m.

Apogee on the 11th at 6.54 p.m.

Perigee on the 24th at 5.42 a.m.

During the evenings of 14th, 15th, and 16th August the planets Venus and Saturn will, with Eta Virginis, a second magnitude star, form an interesting group in the north-west.

6 Sept.	○ Full Moon	5 47 p.m.
14 "	☾ Last Quarter	8 20 p.m.
21 "	☾ New Moon	2 38 p.m.
28 "	(First Quarter	8 40 a.m.

Apogee on the 8th at 4.12 a.m.

Perigee on the 21st at 3.36 p.m.

About 3 o'clock on the afternoon of 30th September a pair of binoculars should afford a view of the Moon and a third magnitude star—Beta Capricorni. In the course of an hour the star may be seen in a small telescope to disappear suddenly on the eastern side of the Moon and reappear on its western side.

The planet Venus will be at its greatest height in the western sky on 15th and 16th September.

The Great Australian Solar Eclipse will occur on 21st September between a few minutes after 3 p.m. to about a quarter past 5.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

QUEENSLAND AGRICULTURAL JOURNAL

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OCTOBER, 1922.

PART 4.

ORGANISATION OF THE AGRICULTURAL INDUSTRY.

The Queensland Producers' Association.

Monthly Record of Progress and Achievement.

The September Session of the Council of Agriculture was held in the Conference Room, Teachers' Training College Building, Turbot street, Brisbane, on Thursday, 21st ultimo. Subjoined is a complete record of Proceedings covering many matters of first importance to the Farming Industry.

ATTENDANCE.

In the absence of the President (the Hon. W. N. Gillies), who was in Melbourne on business in connection with the meat industry, the Vice-President (Mr. J. Purcell) presided.

There were also present: Messrs. H. C. Quodling, J. W. Davidson, W. J. Short, F. M. Ruskin, H. I. H. Ross, W. Ranger, S. J. Howe, F. J. Morgan, T. Muir, R. Swan, T. A. Powell, W. G. Bachelor, G. H. Pritchard, C. V. Hives, H. Keefer, W. Purcell, T. Flood Plunkett, J. D. Story, and J. F. McCaffrey (Secretary).

THE DIRECTOR WELCOMED.

Mr. L. R. Macgregor, the newly appointed Director of the Queensland Producers' Association, was officially welcomed by the members of the Council, and in the course of a brief acknowledgment he expressed his appreciation of the honour conferred upon him in being invited to organise the big undertaking upon which the Council had embarked. He had not underestimated the immense possibilities for the benefit of agriculturists and the State as a whole which lay ahead of the movement that the Council had brought into being.

"A Record to Lose."

"I came here," remarked the Director, "with a record to lose. There are few of the big agricultural schemes which have recently been brought into being in the Western State with which I have not been associated in some way or other, and I think that I can say that I have left behind over there a few monuments." Continuing, Mr. Macgregor said: "I was privileged to enjoy the confidence of the agriculturists over there, and I thank you for the faith you have shown in me in asking me to come here. Confidence will be a matter of development. I trust that, as the days go by, your preliminary faith in me will develop into actual confidence and trust.

"Much has been accomplished by you in the way of preliminary organisation. I have had an opportunity of examining this in a casual way during the past day or two, and I should like to take this opportunity of congratulating all concerned on what has been done. I feel that the foundations of the structure have been well and truly laid.



PLATE 52.—MR. L. R. MACGREGOR,
Director of the Queensland Producers' Association.

Unity and Co-ordination Essential.

"I would like to congratulate the agriculturists of Queensland," continued Mr. Macgregor, "upon the way in which they have already organised themselves in various directions; for example, in the sugar and butter industries. In wheat, too, you have an object lesson here. The steps which have been taken by the primary producers in Queensland are being watched by producers in other States. Your influence has been felt elsewhere. Still there is much more to accomplish. There has not hitherto been that co-ordination of effort which is so necessary. The most pressing agricultural problems are national, and not sectional. They must be examined and solved from the broader standpoint, and the organisation which you have brought into being affords an adequate means whereby primary producers of all sections may act and work together for their common good. Without that essential co-ordination and the unity of the producers into one organisation, those problems cannot be properly tackled.

"One has only to mention such matters as conservation of fodder, finance of agricultural development, and stabilisation of prices, to realise that action by any

one section of agricultural industry would be well-nigh valueless. You have now in the Council of Agriculture that which you formerly lacked—viz., means whereby producers as a whole may speak with one voice and act in unison in seeking to solve their difficulties and effect pressing and necessary improvements.

From the Abstract to the Concrete.

“Some of these terms that I have used—Conservation of fodder, co-ordination of effort, stabilisation of prices, and exploiting of new markets—are all terms which have been talked glibly for long. It is now for this organisation to translate into action and give definite shape to these things which have hitherto been in the nature of ideals.”

In the course of further observations, Mr. Macgregor emphasised the importance of what sometimes is considered the subsidiary sections of the industry. He instanced eggs and honey, and in stressing this point stated that, although the United States of America is the greatest wheat-producing country in the world, the value of the eggs produced there is greater than the value of the wheat production. He referred to the value of organisation in creating a local market for honey in one of the other States, and said that this principle could be applied to some of Queensland's primary industries which are at present in a struggling condition.

From early years he had been associated with agricultural problems. He felt that in their scheme were potentialities of immense value to the producers of this State, and his best energies would be devoted to the service of the man on the land.

ADMINISTRATIVE COMMITTEE.

Duty on Imported Maize.

In connection with the duty on imported maize, a communication had been received from the Tariff Board to the effect that the duty on imported maize is 3s. per cental, but under the tariff agreement between South Africa and the Commonwealth maize of South African origin is admitted into Australia at a duty of 1s. per cental.

“The question of increasing the duty on maize from South Africa,” the communication stated, “is to be considered in connection with the new reciprocal tariff arrangements that are to be made between that country and the Commonwealth.”

The Council recommended that the reply from the Tariff Board be noted, and the following recommendations were approved:—

- (i.) That the Director be requested to collaborate with the Wheat and General Committee for the purpose of preparing a brief but lucid statement as to the importance of the subject to maizegrowers.
- (ii.) That such statement be communicated to Local Producers' Associations, and that they be invited to pass a suitable resolution to the effect that the Council make strong representations to the Tariff Board in favour of the recognition of the request of Queensland maizegrowers for an increased tariff on South African maize when the new reciprocal tariff arrangements are being made between the Commonwealth and the South African Union.
- (iii.) That such resolution be forwarded to the Minister for Trade and Customs and to the Queensland members of the Senate and of the House of Representatives.
- (iv.) That when the statement has been prepared it be communicated to the Press with an intimation as to the action which the Council of Agriculture is taking.

Advisory Board for the Fruit Industry.

The selection of producers' representatives on the State Advisory Board of the National Council of Fruitgrowers was approved by the Council of Agriculture as follows:—

- (a) The members of the Fruit Standing Committee of the Council of Agriculture—namely, Messrs. T. H. Brown, S. J. Howe, W. Ranger, H. I. H. Ross, and F. M. Ruskin;
- (b) Together with Messrs. Myles Fox, L. R. Macgregor, and J. R. Morris.

This Committee was directed to work in co-operation with the Council of Agriculture.

Local Producers' Association—Farmers Enrolling

The Supervisor of District Agents reported that very satisfactory progress is now being made by the district agents in the forming of Local Producers' Associations in their respective districts. Reports indicated that the policy approved by the Council in connection with the reorganisation of agriculture is receiving the support and co-operation of producers in all centres. At the present time 230 Local Producers' Associations have been formed, and 4,500 primary producers enrolled as members of the Queensland Producers' Association. Successful meetings have been held recently in the North, notably on the Atherton Tableland, Townsville, and Ayr districts, and large numbers of producers in each centre have enrolled. Similar satisfactory progress is reported from the North Coast, the Downs, and Western districts, where excellent enrolments have taken place. Provision has been made to enable producers in centres which have not yet been visited by the district agent to form local associations where such associations are not already in existence. This step has been taken in view of the fact that to enable producers in each centre to have a voice in the election of councillors, a Local Producers' Association must be formed not later than 30th November next.

Assistance in Water-finding.

The question of securing water supplies, being of paramount importance in the successful settlement of agricultural areas, which suffer periodically from inadequate rainfall, was a recommendation submitted for consideration by the Council on behalf of the producers resident in such areas. The Department of Public Lands advised the Administrative Committee that a tentative proposal designed to afford settlers in these areas with facilities for securing water has been formulated by officers of the Department, and the scheme has been under consideration by the Government for some time. The Government, however, has not yet arrived at a decision on the matter. The main difficulty, the Department advised, is finance, as obviously any such scheme must involve the outlay of considerable sums of money. An officer is employed by the Department, whose sole duty is to locate sites for obtaining subterranean stores of water. The services of this officer are made available at a purely nominal fee to all selectors throughout the State. It was decided that the Council of Agriculture make further inquiries as to possible future developments in the direction indicated.

Architectural Assistance.

In the opinion of the Administrative Committee it was thought desirable that the Council should be in a position to offer helpful advice and suggestions to producers in the matter of designs of buildings and equipment for butter and cheese factories, storage accommodation for fruit, and in other directions, and to that end the Committee recommended that the Council appoint a consulting architect, to be paid only for services rendered to the Council from time to time. The recommendation was approved, and it was decided that the consulting architect be asked to prepare suitable plans for a storage plant at Mapleton; with appliances to cope with 30,000 cases of oranges.

Administrative Staff

In connection with the permanent positions which it will be necessary to establish, the Administrative Committee was authorised to confer with the Directors regarding the duties to be allotted to each position, the salaries to be paid, and the conditions of appointment in each case.

DAIRY COMMITTEE.

In submitting his report to the Council, the Chairman of the Dairy Committee desired that the Commissioner for Railways be thanked for the assurance given at the recent meeting of the Transport Committee that no discrimination would be made in applying the 20 per cent. reduction to all dairy produce carried over the Queensland railways, irrespective of destination.

Stabilisation Scheme.

Notwithstanding that butter factories in other States have agreed to fall in with the stabilisation proposals, and to stand by the producers, reports from Melbourne indicate that adverse propaganda in Victoria has induced ten factories to oppose the scheme. The acceptance of the scheme was conditional upon practically the whole of the butter and cheese manufacturers adopting it and binding themselves to abide by the agreement. In view of its importance to Australian dairymen, a further effort on the part of the Dairy Committee will be made to induce the opposing factories in Victoria to come into the scheme. Messrs. T. Flood Plunkett, W. Purcell, and W. T. Harris, who proposed to visit Melbourne for the purpose of attending the Federal Dairy Council meeting, were requested to endeavour, while in the Southern State, to induce the directors of the factories standing out to adopt the proposal which has for its objective the betterment of those engaged in the dairying industry and the maintenance of a fair price for their products.

Uniform System of Accountancy.

The desirability of a uniform system of accountancy for butter factories and kindred enterprises was urged by the Committee, and the Council approved of the appointment of a small expert committee to consider the whole question and report thereon to the Council.

FRUIT COMMITTEE.

The Fruit Committee recommended:—

- (i.) That concrete instances of loss of empty cases from canneries be brought under the notice of the Committee.
- (ii.) That in the opinion of the Fruit Committee the most effective way to guard against ravages by marsupials is by the erection of wire netting around orchards, and with a view of enabling growers to obtain wire netting at a reasonable price it is desirable that the netting should be purchased through co-operative channels in connection with the general question of co-operative buying for agricultural requirements.
- (iii.) That every possible protection be afforded to insectivorous birds, and that the Department of Agriculture be asked to afford protection to such birds.
- (iv.) That an effective system of centralisation be adopted in regard to canning factories; that legislation be introduced in connection with the rough handling of fruit.
- (v.) That the particulars relating to the prohibition of flashlights be brought under the notice of district agents and Local Producers' Associations.
- (vi.) That it be suggested that the subjoined minute be brought under the notice of the Director of Forests, with an intimation that the Local Producers' Association at Woombye reports that this is a serious matter to fruitgrowers:—

That pine logs and tops used for the construction of fruit cases be not subjected to Government royalty, and that action be taken to make those conditions apply to a large sawmill where case-manufacturing expenses can be reduced to a minimum.

The recommendations of the Fruit Committee were all approved.

THE FUTURE OF THE SUGAR INDUSTRY—CONSIDERED BY THE COUNCIL OF AGRICULTURE.

The Case for the Renewal of the Federal Agreement.

"The continuance of the Sugar Agreement is of vital importance to Queensland and Queensland producers, and to the Commonwealth as a whole."

"The burden of the 'WHITE AUSTRALIA' policy is practically being borne by the sugar industry of Queensland, as the settlement of our Northern littoral by producers of cane grown by white labour is essential for the preservation of that ideal and for the purposes of national defence."

At the last meeting of the Council of Agriculture reference was made to the present position of the sugar industry, and a strong case for the renewal of the Federal Sugar Agreement was made out by the Chairman of the Administrative Committee (Mr. J. D. Story).

In the course of his remarks Mr. Story said that the continuance of the Sugar Agreement is of vital importance to Queensland and Queensland producers, and to the Commonwealth as a whole.

On Thursday, 15th June, the Council, upon the recommendation of the Sugar Standing Committee, passed the following resolution:—

"That owing to the greater stability afforded to the sugar industry by the Sugar Agreement, this Committee recommends the Council to favour a continuance of the Agreement between the Commonwealth and the State Governments, and to undertake, through its District Councils and Local Producers' Associations and affiliated societies, to further by every means the object sought."

One of the objects of the organisation of the agricultural industry under the general direction of the Council of Agriculture was to give the producers an opportunity of taking concerted action in matters pertaining to agriculture as an industry. Seeing that the organisation of the industry had now proceeded to such an extent that 250 Local Producers' Associations had been established throughout the State, and that additional associations are being formed daily, the Council was, he submitted, of opinion that the Organisation had so far advanced as to enable it to use its weight with effect in advocacy of a question of such very great importance to the State of Queensland and to the Commonwealth as the continuance of the Sugar Agreement. He moved—"That the Council therefore resolves:—

- (a) That the resolution regarding the continuance of the Sugar Agreement passed by the Council on the 15th June, on the recommendation of the Sugar Standing Committee, be communicated to each L.P.A.
- (b) That a brief, concise, but impelling presentment of the sugar question be submitted to each L.P.A.
- (c) That each L.P.A. be invited to pass at the earliest opportunity a resolution supporting the resolution passed by the Council.
- (d) That such resolution be communicated to the Council, and, by the Council, be transmitted through the proper channels, or direct, as the case may be, to the Prime Minister, the Minister for Trade and Customs, the Queensland members of the House of Representatives and of the Senate, and to the publicity agent in Melbourne who is watching Queensland's sugar interests.
- (e) That the foregoing resolutions be communicated to the Press."

The resolution was approved by the Council as a whole, and Mr. Story then dealt with the draft presentment of the sugar question and its importance to Queensland producers.

He said that in 1920, following decreased production, with the consequential importation of foreign sugar at a high price to meet Australia's requirements, the Commonwealth Government, in order to stabilise the sugar industry and to stimulate production, entered into an agreement with the Queensland Government to purchase the whole of the raw sugar produced in the State during the seasons 1920-21, 1921-22, and 1922-23.

Briefly, this agreement provided for:—

- (1) The purchase of raw sugar at £30 6s. 8d. per ton.
- (2) Equitable distribution of the £30 6s. 8d. to the producers, namely, the millowners and the canegrowers.

The Federal Government subsequently arranged with certain companies for the refining of such raw sugar and for its sale and distribution in Australia at 6d per pound, such price being necessary in order to provide funds sufficient to recoup losses incurred in respect of sugar importations.

Continuing, the speaker said that the continuance of the Sugar Agreement is of vital importance—

- (1) To Queensland and Queensland producers; and
- (2) To the Commonwealth as a whole.

To Queensland, because—

- (1) There are 25,000 persons directly engaged in the sugar industry in Queensland, of whom 4,000 are actually canegrowers.
- (2) There are approximately 100,000 persons, including the population of many of our Northern towns, who are directly and indirectly dependent on the industry.
- (3) There is approximately £15,000,000 invested in connection with the Queensland sugar industry in sugar mills, tramways, plantations, refineries, and other related enterprises.
- (4) The sugar industry is the most important rural industry in Queensland, both in value of production and in wages paid to those engaged in it.
- (5) The fixation of an equitable price for raw sugar ensures to the canegrowers a fair price for their product, and thus stabilises the industry and provides for the employment of a large number of workers at good wages.

To the Commonwealth, because—

- (1) The burden of the "White Australia" policy is practically being borne by the sugar industry of Queensland, as the settlement of our Northern littoral by producers of cane grown by white labour is essential for the preservation of that ideal and for the purposes of national defence.
- (2) There is no present prospect of the establishment of any other industry on a considerable scale on the rich tropical lands in the North, and the importance of the industry as a means of settling these lands and as a source of wealth to the community cannot be overstated.
- (3) Encouragement of the sugar industry by stabilisation will enable Australia to produce sugar sufficient for her own requirements and to be independent of foreign countries for her supplies.
- (4) Economically, it is better for Australian consumers to pay a fair price to Australian producers than to pay a lower price to foreign countries.

The Council of Agriculture approved of the Queensland Producers' Associations strongly supporting the representations now being made to the Commonwealth Government on behalf of the canegrowers in respect to the renewal of the Federal Sugar Agreement, on the grounds stated, for a further term, and agreed to submit the question for consideration by the Local Producers' Associations.

It is suggested that if the L.P.A.'s are in accord with the objective of the canegrowers, resolutions should be passed accordingly and forwarded to the Council.

GRAPE CULTURE IN QUEENSLAND.

By ALBERT H. BENSON, M.R.A.C., Director of Fruit Culture.

PART IV.

SUMMER PRUNING.

This is described in Mr. Ross's pamphlet as follows:—

"In the case of vines that have been properly spurred back at the winter pruning—*i.e.*, each spur pruned to one, two, or more eyes according to the vigour of the canes and the variety of grapes—each bud should have put forth one or more shoots. Where more than one shoot occurs, the weakest should be rubbed off, leaving one shoot only at each node. If the vine is not a vigorous grower, one shoot may be sufficient to leave on each spur; on the other hand, where growth is rampant, two or more shoots may be allowed to proceed from the spurs. Overcrowding is to be avoided by entirely suppressing some of the intermediary shoots where the long spur or cazenave is adopted.

"It often happens that amateurs and inexperienced growers leave many more bunches on the vine than it can properly support, especially in the case of young vines of three years old, and the consequence is that the bearing period, and even the life of the vine, is shortened, or its production diminished in after years; therefore, the disbudding of fertile shoots may be equally important with that of the barren ones. The uppermost shoot, or shoots, of a spur generally absorb an undue amount of sap to the detriment of the base shoot. Such growth must be carefully watched, and, if extraordinary vigour is produced, it may be checked either by bending down the shoot or pinching out the terminal points. The side branches from these shoots, called laterals, produced from below the node where the bunch is situated, should be rubbed out; but laterals from the nodes at and above the bunch may be pinched at the first or second leaf. The lower shoot of a spur—*i.e.*, the one nearest home—should be encouraged to grow strong, as this will constitute the fruiting spur for the following year. Indiscriminate topping must be avoided. The leading shoots of the vine should be allowed to extend their growth almost to an unlimited extent, but in cases where they are outbalancing the vegetative activity of the vine, they should be stopped. It is even better to bend down the shoots than to top them too severely. The object of this method is to preserve as much well-grown foliage as possible for the accumulation of sugar and elaboration of sap for the benefit of the fruit and lignification of wood. The bunches are always better developed, more handsome in appearance, and of higher quality when ripened in the shade; but when the shade becomes too dense it is better to strip off a few of the older leaves at the base that have fulfilled their purpose than to cut away the branches."

Water-shoots—that is, new growths starting direct from old wood and not from buds of the previous year's growth—should be removed, excepting where it is necessary to provide for a new spur or rod to take the place of one that has either died out or which has outlived its usefulness. In this case the water-shoot so left should be cut hard back the following winter so as to cause it to produce good fruiting wood for the succeeding season.

Different varieties of grapes require different methods of pruning; thus the following varieties should be spur pruned to not more than two eyes, *viz.*:—Alicante, Aramon, Black Hamburgh, Chaouch, Chasselas

(Sweetwater), Cinsaut, Cornichon, Doradillo, Frontignan (various), Muscats (all), Royal Ascot, Trebbiano, Waltham Cross, and Wortley Hall. The following varieties, however, require to be pruned long in order to produce the best results, viz.:—Almeria (Ohanez), Black Prince, Cabernet Sauvignon, Centennial, Gros Colman, Hermitage, Sultana, and Zante Currant.

The varieties mentioned both with respect to short and long pruning are merely given as examples, as it often happens that the method adopted must be modified so as to suit the growth of individual vines, even though they are of the same variety. Thus vines which produce too much wood in comparison with their yield of fruit should be pruned longer, and those that produce a number of small bunches and comparatively little wood should be pruned more severely.

In the case of Sultanas and Zante Currants, special methods of pruning are in use in some places; but as a rule the Cazenave Cordon that has been already described gives good results.

A very large number of different varieties of grapes have been tested from time to time in Queensland, and the following list includes those that have been proved by experience to be most reliable in the following districts:—

1. *Coast of Southern and Central Queensland.*—Black Hamburg in isolated districts, such as Pinkenba and Enoggera near Brisbane, Kolan district near Bundaberg, and Westwood near Rockhampton. Sweetwater.—In the same districts as Black Hamburg. Muscat Hamburg.—Enoggera, Kolan, and Westwood. Syrian.—Pinkenba and Westwood. Red Frontignan.—Rockhampton district. Chaouch.—Pinkenba. Madaline Royal.—Generally where the climate is not too humid. Wilder, Goethe, Iona Linoir, Concord, Alvey, Isabella, and Ferdinand de Lesseps.—Generally, except where the rainfall is too heavy or there is too much humidity.

2. *The Foothills of the Coast Range to the purely Coast Districts.*—All the grapes mentioned as suitable for the coast will thrive here, as well as the following:—Royal Ascot, Aramon, Cinsaut, Gros Colman, Trebbiano, and Sultana.

3. *Stanthorpe, Southern and Coastal Downs.*—All the varieties previously mentioned, as well as the following:—Alicante, Centennial, Doradilla, Gros Colman, Henab, Turki, Madrasfield Court, Mrs. Pince's Black Muscat, White Mourillon, Purple Cornichon, Black Prince, Waltham Cross, and Wortley Hall.

4. *Western Downs.*—All the varieties mentioned for the third district, as well as Gordo Blanco, Sultana, Zante, Almeria or Ohanez, Flame Coloured Tokay, and the following wine grapes:—Hermitage or Shiraz, Mataro, Grenache, Cabernet, Malbec, Roussane, Reisling, Semillon, Verdelho, and Pedro Ximines.

Many other varieties than these mentioned can be grown, but the list I have given includes most of the sorts that have proved during the past twenty-five years to be most suitable for growing in the districts mentioned.

MARKETING THE CROP.

When grapes are grown for the fresh fruit trade, the greatest care should be taken in cutting, handling, and packing the bunches, as the price obtained will depend very largely on the condition in which the

fruit reaches its destination. It must not be bruised, and its natural bloom should be on the fruit when exposed for sale. Prior to packing, the bunches should be carefully examined and all injured, immature, or faulty berries removed. If the fruit is to be sent any distance it should not be packed until it has been gathered for some hours, in order that the stems may wilt a little, as by doing so there is less danger of berries leaving the stalks. The fruit should be quite dry, and when the stems are slightly wilted it should be so firmly packed in the case in which it is to be marketed that it will not shift during the journey. At the same time it must not be packed so firmly as to crush or injure the fruit in any way. The cases used to carry the fruit should always be lined with clean white paper, and the fruit should be graded for colour, size, and quality. It is a great mistake to market immature fruit, as there is no demand for it; and, further, it is very apt to prejudice those buyers who have been unfortunate enough to purchase it, and to put them off from making any further purchases. Grapes for wine should be fully ripe and perfectly sound. Immature grapes, over-ripe or decayed grapes, will never make a sound wine. They can, however, be made into wine fit to be put through the still for the production of alcohol to be used for fortifying other sound wines.

Hitherto very little attention has been devoted to drying grapes in this State, our local requirement for raisins, sultanas, and currants being met by the produce of the Southern States. Comparatively few kinds of grapes are grown commercially for drying, the bulk of the raisins, sultanas, and currants used in the world being grown from the White Muscat of Alexandria or Gordo Blanco, the Sultana or Thompson's Seedless, and the Zante or Corinth currant grapes. Other sorts are dried to a small extent, but the trade lines are confined to those mentioned. All these can be grown in Queensland, but before their produce is fit for drying it must be very rich in sugar; otherwise the fruit will dry light and be of poor colour and quality. This necessitates drying-grapes being grown in hot and dry districts, as it is only under such conditions that the fruit will produce a maximum sugar content in its juice and so produce a heavy, meaty, dried product. The manufacture of raisins, &c., should therefore not be attempted commercially unless the climatic conditions are favourable for the production of the right kind of fruit to dry and the right kind of weather in which to dry it.

MANURING THE VINEYARD.

If the soil is of good average fertility there is seldom any necessity to apply fertilisers during the first few years, as there is an ample supply of plant food quite sufficient for the production of strong, healthy vines capable of yielding good crops of fruit. Vines are not very severe on the soil, especially if the ashes obtained from burning the prunings are returned to it. At the same time, if the vines show signs of deterioration not due to disease or drought they will benefit materially if judiciously manured. A complete manure for vines should contain its plant food in the following proportions—viz., three parts phosphoric acid, three parts nitrogen, and five parts potash. An acre of vines in full bearing will require a manure containing 30 lb. of phosphoric acid, 30 lb. of nitrogen, and 50 lb. of potash, and these plant foods can be supplied by 2 cwt. super. or basic super., 1 cwt. sulphate of potash, and 1½ cwt. sulphate of ammonia.

Where green crop manuring is applied, the quantity of sulphate of ammonia can be materially reduced, and on granite soils containing

potash there is seldom any necessity to apply this plant food, but an application of basic super. and sulphate of ammonia or its equivalent in nitrogen in the form of green manure will be ample.

Soils deficient in lime should receive a dressing of about 1 ton of air-slacked lime or finely ground limestone every five or six years, as lime is essential to the proper development of the vine and forms an important part in the ash constituents, especially in that of the wood. Basic super. is preferable to ordinary super. in all soils that are at all sour or are in any way deficient in lime.

DISEASES OF THE VINE.

Vines are attacked by insects of many kinds, and are very subject to fungus diseases, especially in districts where the climate is more or less humid, and even in drier districts during periods of prolonged rainfall. Fungus diseases, however, do little damage when the climate is hot and dry during the growing and ripening periods. With respect to insect pests, the most serious is phylloxera, but fortunately there is, as far as I am aware, now no trace of this pest in the State, though it made its appearance here in one district some eleven years since. The steps taken for its eradication have evidently been a success, as I have neither seen nor heard of any trace of this pest since my return to Queensland in 1915, so I trust that the State is now free from it. *Phylloxera vastatrix* is a very minute yellow insect that lives by suction on the roots of the vine and thus saps the vigour of the plant, and eventually destroys it. It produces small galls or swellings on the roots, and the plant soon shows signs of distress, such as losing its colour and presenting a generally unhealthy appearance. Plants such as described should be carefully examined, as should this pest make its reappearance it is very likely to spread rapidly; consequently action, to be effectual, would have to be taken immediately. There is no cure for this pest other than absolute destruction. Certain varieties of grapes are able to resist its attack and are used as stocks on which to work more susceptible kinds, but none are immune. Every necessary precaution is therefore being taken to keep our State clean.

Vines are frequently attacked by nematodes which infest and destroy the roots, especially those growing near the surface. At first sight the attack of nematodes may easily be mistaken for phylloxera because, like that insect, they produce numerous small galls or swellings on the roots, but when these are examined by means of a good lens the difference is easily recognised. No minute yellow aphids are seen, and the galls when cut open show the cysts of the nematodes. In severe cases the roots are badly injured and large galls are formed. Nematodes are very difficult to destroy once the soil has become infested, but fortunately the damage they cause can be, to a very great extent, prevented by not allowing the growth of any surface roots, as the roots coming from the base of the cutting are seldom badly attacked.

Leaf-eating insects of various kinds, such as caterpillars of sorts, grasshoppers, crickets, weevils of sorts, &c., frequently injure the leaves, shoots, wood, and fruit, but the damage they do can easily be prevented by the judicious use of arsenate of lead spray, either alone or in combination with Bordeaux or Burgundy mixtures.

The larvæ of several species of borers also destroy the wood. Spraying with arsenate of lead will destroy the mature insects, but the larvæ are best destroyed by cutting out and burning the wood in which

they are harbouring. Scale insects are sometimes troublesome, but as a rule if the vines are properly treated in winter these do little damage. Should it be necessary to spray specially for these pests the spraying should be given before the scales are fully developed, when a weak oil spray will prove effectual. Mealy bugs have also given trouble the last year or two in some coast vineyards, by attacking the bunches when approaching maturity. Under normal conditions this pest is kept in check by predacious ladybirds, but when the latter are absent the best remedy is to spray the bunches with clean water applied with sufficient force to dislodge the insects, as sprays sufficiently strong to kill them would be apt to seriously damage the fruit.

ANTHRACNOSE OR BLACK SPOT OF THE VINE.

This is undoubtedly the most difficult pest the grapegrowers of this State have to contend with, as no part of the State is free from its ravages, and very few of the varieties of *Vitis vinifera* are immune to its attack. American varieties and resistant stocks are more or less immune, but unfortunately they are not of anything like the same commercial value, either for table use or winemaking, as those of the true grape or *Vitis vinifera*. Some varieties are, however, much more resistant than others, and the growth of such should be encouraged and that of highly susceptible varieties should be discouraged, as the cost of treating the latter will, in many cases, be greater than the value of the returns. The treatment of this disease is mainly a preventive one, as once it has made its appearance in a vineyard, although it may be checked, it cannot be stamped out, and where the weather conditions are favourable for its development it will frequently increase and spread in spite of all treatment.

The main object is, therefore, to endeavour to destroy all traces of the disease whilst the vine is dormant, during winter, and to follow up this winter dressing by a systematic treatment commencing when the buds begin to swell and continuing till the fruit is fully developed.

The winter treatment is given when the vines have been pruned and whilst they are still dormant. It consists, first, in gathering and burning all prunings; second, in removing all loose bark, superfluous or overgrown spurs, and carefully burning same; and, third, in painting or swabbing the whole of the vine with a concentrated solution of sulphate of iron and sulphuric acid, made by dissolving 5 lb. of sulphate of iron in a gallon of water and adding to it $\frac{1}{2}$ lb. of commercial sulphuric acid.

This, in my experience, is the best winter treatment, though the use of a 10 per cent. solution of sulphuric acid, made by adding 1 lb. of sulphuric acid to 9 lb. of water, is also a very good remedy.

The object of the winter treatment is to destroy the resting spores of the fungus which are harbouring in the vine, and thus to give the young growth in spring a fair start. The winter treatment must be followed up by spraying with Bordeaux mixture—first, when the buds are swelling, and subsequently as often as necessary to protect the young growth. Bordeaux mixture is not a cure once the disease has made its appearance, though it will even then tend to check its spread; but if systematically applied in time it is a preventive, as the spores of the fungus cannot germinate on the wood, leaves, or fruit that is protected by the spray.

Where owing to weather conditions proving favourable for the spread of the fungus or from other causes the disease becomes well established, badly infested shoots should be cut off and burnt, and every care should be taken to see that the following winter's treatment is rigidly carried out.

OIDIUM OR POWDERY MILDEW OF THE VINE.

Like anthracnose, this disease is much easier to prevent than to cure once it has become firmly established; the treatment is therefore a preventive one, and consists of sulphuring the vines, as the fumes that are given off from the sulphur dusted on the vines will prevent the germination of the spores of the fungus. The first sulphuring should be given when the vines have made a few inches growth, and subsequent dressings should be given as required, the frequency or otherwise of such dressings depending on weather conditions. With dry weather there is not much chance of the fungus making a start, but with the advent of moist, muggy, or foggy weather it soon gets to work, and regular and systematic treatment is then necessary. The sulphur should be in the finest state possible, as the finer it is the better the results, and it is best applied by means of a special sulphuring machine, though should such a machine not be obtainable a sulphur bellows or even a bag of moderately open texture filled with sulphur and tied to the end of a stick and shaken over the vines will do.

Where neglected, oidium completely destroys the crop in bad cases, the berries being all stunted, discoloured, and frequently cracked, where Bordeaux mixture is being regularly used for the treatment of anthracnose, there is seldom any necessity to take special precautions for oidium, as the mixture is an effectual preventive.

DOWNY MILDEW.

Downy mildew can be prevented by systematically spraying the vines before it appears. Growers are urged to spray for their own protection. In respect to sprayings definitely provided for by the Regulation, it is questionable whether the first spraying, which is given just before the buds burst, is actually needed, but it is certainly of great value in the case of anthracnose or "black spot," which is a very serious and common fungoid disease of the vine. It is often found attacking the same plant as downy mildew, and should not be neglected. The second spraying before the vines blossom—that is, when they have grown from 10 to 18 inches—protects the new growth from infestation; and the third spraying, given when the blossom has set, protects the foliage produced after the second application.

If the weather conditions are very favourable for the development of the fungus causing downy mildew, viz., warm, moist, or foggy, it may be necessary to give an extra spraying, or even two, between the second and third sprayings. These extra applications may be made even during the blossoming period, as it is better to run the risk of losing a few berries than the loss of the whole crop. The number of sprayings necessary after the fruit has set will depend entirely on the weather. If it is warm and dry, further applications may not be necessary, but if moist and muggy, spraying must be continued, otherwise the new growth will suffer and the bunches will become affected.

The fungus that causes downy mildew is not merely a surface growth, but it extends right through the vine and is carried over from season to season by the spores that remain dormant in the old leaves during the winter and become active in the spring—probably about the end of September or early in October in the coastal districts, and a little later



PLATE 53.—DOWNY MILDEW ON VINE LEAF.

in inland regions. These spores are carried by the wind, and, if they lodge on the upper side of a moist vine leaf, they begin growth at once, provided the atmospheric conditions are favourable and the leaf has not been protected by spraying with a germ-destroying specific.

The first sign of a disease is a brownish spot on the upper surface of the leaf that looks as though a drop of oil had been deposited upon it. This is known as the "oil-spot" stage. In the course of a day or so a white downy growth appears on the under side of the leaf exactly opposite the "oil spot," and it is from this development that the disease takes its name. This downy growth produces countless spores, which are distributed broadcast by the wind. Each of these spores is capable of reproducing the disease if it comes in contact with a vine leaf under conditions favourable to its development.

When neglected, downy mildew spreads with alarming rapidity when the weather is favourable, and the entire crop of a district may be destroyed in a very short time; hence the great importance of taking precautionary measures.

The illustration herewith gives a good idea of the disease in the "downy" stage, and should enable anyone to recognise it at once. In the later stage of the disease the leaves turn brown, dry up, and fall off, the fruit is destroyed, and, in severe cases, all new wood growth is killed, so that not only is there no crop for that season but none also for the following year.

REMEDY.

The remedy for this disease is to give the leaves of the vine a protective covering before the resting spores become active in spring, and to keep them protected as long as risk to the crop exists. The best spray is Bordeaux mixture, 4-4-40; 4 lb. bluestone, 4 lb. quicklime, and 40 gals. water, made according to the directions given in departmental publications dealing with the destruction of fruit and vegetable pests. The spraying material must be neutral; that is to say, it must not contain any free sulphate of copper (bluestone), and this is determined by adding a drop of a solution of ferro-cyanide of potassium to a small quantity of the mixture. If there is no discoloration, the mixture is neutral, but if there is a brown ring round the drop of ferro-cyanide, free bluestone is present and more lime must be added. If vignerons have any difficulty of obtaining ferro-cyanide of potassium, a small quantity of the solution for testing purposes can be obtained from the Agricultural Chemist.

Bordeaux Mixture (4-4-40) is prepared as follows:—

- (1) Dissolve 4 lb. of bluestone in 20 gallons of cold water in one cask by placing it in a bag and suspending it in the water.
- (2) Slack 4 lb. of unslacked lime in another cask slowly by first pouring about 3 pints of water over it. This will reduce the lime to a thick cream free from lumps. Water should now be added, stirring well till there are 20 gallons of milk of lime in the cask.
- (3) Stir the milk of lime up well, strain it and pour the whole of the 20 gallons of milk of lime and the 20 gallons of bluestone water together slowly into a third cask; stir well for 3 minutes, and if properly made the mixture is fit for use.

The mixture is much better if made in this manner than when a strong solution of bluestone and lime is first mixed together, and water to make up the required quantity is afterwards added.

In order to see if the mixture is properly made, plunge the blade of a knife into it for a minute. If the knife is untarnished, the mixture is all right; but if the knife is stained a coppery colour, then more milk of lime must be added. This is only a rough test; and where accuracy is necessary the mixture should be tested as follows:—To a small quantity of a solution of ferro-cyanide of potassium in a test tube or small glass add a few drops of the mixture to be tested. If it turns brown, more lime is required to be added till the mixture fails to produce the brown colour. The solution of ferro-cyanide of potassium is made by dissolving 4 oz. of this substance in one pint of water. The resultant mixture is very poisonous, and should be handled with care.

The mixture should always be neutral, as if there is an excess of bluestone it is apt to injure the foliage. Use water that is free from iron, and do not make the mixture in iron, zinc, or tin vessels of any kind—wood is the best.

If desirable, a stock solution of bluestone may be kept on hand for use as required. Such a solution may be made by dissolving 100 lb. of bluestone in 50 gallons of water. Place the 100 lb. of bluestone in a bag and suspend it in the cask of water, and in the course of a couple of days the whole of the bluestone will be dissolved, and each gallon of the solution will contain 2 lb. of bluestone.

To make the 40-gallon solution you therefore take 2 gallons of the stock solution of bluestone and add 17 gallons of water to it, to make up the 20 gallons of bluestone solution for mixing with the 20 gallons of milk of lime as previously described. A stock solution of milk of lime can also be made, but it is better to make it as required.

POURRIDIE OR MOULDY ROOT.

This is a rotting of the roots, due either to the presence of a fungus such as *armillaria*, to unsuitable soil, or bad drainage. Liming the soil is the best remedy, but when the vines are badly diseased it is better to take them out and burn them. Sulphate of iron applied to the trunk and main roots in winter has sometimes a good effect.

SHANKING.

This term is applied to cases when the vines blossom and yet fail to set their fruit. It is not, properly speaking, a disease, but is due to physiological conditions such as sudden climatic changes, inherent weakness in the vine, failure to produce perfect flowers, &c. Certain varieties are more subject to it than others, and the following remedies are suggested:—Cincturing the shoot just below the joint where the bunch starts a few days before blossoming; or pinching the bearing shoot just prior to blossoming, or sulphuring the vine whilst in blossom. If neither of these remedies has any effect, the only thing to do is to cut the vine back and graft it with a variety that is a regular setter.

FRUIT FLY INVESTIGATIONS.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the following report from Mr. Hubert Jarvis, the Entomologist in charge of Fruit Fly Investigations at Stanthorpe, dated the 27th August, and covering the period 14th July to 20th August, 1922.

WINTERING OF FRUIT FLY.

Renewed search has been made for the pupæ of the fruit fly (*B. tryoni*) in the soil under orchard trees in the following districts:—Stanthorpe, Applethorpe, Diamond Vale, Thulimba, The Summit, Cotton Vale, Beverley, and Ballandean.

In no instance were any live pupæ met with, nor were empty pupæ-cases by any means plentiful—the majority, if formerly present, having probably rotted and gone to pieces in the soil.

PUPÆ IN PACKING SHEDS.

An instance of fruit fly pupæ (two only) wintering in apples (Rhymer variety) stored in the packing-shed was brought to my notice by Mr. D. Pfunder, of Applethorpe. A search on 3rd August, 1922, in this orchardist's shed resulted in two more specimens being secured. These were found in the crevices between the flooring boards; empty pupæ cases (from which the flies had probably emerged in late autumn) were quite numerous here also.

Search in and under other packing-sheds in various parts of the district has failed so far to bring to light additional specimens of living fruit fly pupæ.

EARLIEST APPEARANCE OF FRUIT FLY.

Experiments are being conducted to ascertain the position or locality in the Granite Belt in which the fruit fly makes its earliest appearance.

DESTRUCTION OF MAGGOT-INFESTED FRUIT.

A very interesting experiment, originated and carried out at Ballandean by Mr. A. E. Watts, of that district, seems to indicate that the burying of maggot-infested fruit between two layers of fresh lime might prove an effective means of destroying the maggots of the Queensland fruit fly (*B. tryoni*).

Mr. Watts in this experiment used a large tin vessel, about 2 feet 6 inches in diameter and about the same in height. At the bottom of the vessel he first placed about 2 inches of soil, then 1 inch depth of fresh lime next the fruit (maggot-infested peaches), this three-parts filling the vessel; then again another 1-inch or 1½-inch layer of lime; and finally on top a dressing of soil.

The contents of this receptacle so charged were recently turned out in my presence, and were then examined by me for any indication of fruit fly pupæ or maggots; but a careful search failed to reveal any sign of either.

A similar method of dealing with maggot-infested fruit might be tried in the orchards, a trench being substituted for the tin vessel. The contents of this trench could, moreover, when well rotted, be used for manuring the orchard with advantage.

It would be advisable, when dealing with a large quantity of fruit in the above manner, to use more lime proportionately than the amount used by Mr. Watts in his experiment.

FRUIT FLY IN IMPORTED ORANGES.

The danger of importing fruit flies into the Granite Belt of Queensland from New South Wales, in orange and other fruits, was recently emphasised.

Mr. C. G. Williams, Government Inspector Diseases in Plants Act, submitted to this Office an orange taken from a consignment sent to Stanthorpe from the latter State. On examination fruit fly punctures were seen to be present, with eggs (hatched) *in situ*. The young maggots had, however, perished, presumably owing to their being unable to penetrate the white felty substance between the outer skin and the fruit.

Other injurious insects found also on imported fruit submitted by the above-mentioned officer for identification were red scale (*Aspidiotus aurantii*), circular black scale (*Aspidiotus ficus*) and Glovers mussel scale (*Mytilaspis gloveri*), all on citrus fruits.

Thus the value of daily inspection work now being carried out can hardly be too much stressed.

OTHER INSECTS OF ECONOMIC IMPORTANCE.

San Jose Scale (Aspidiotus perniciosus).—An instance of this destructive scale insect occurring on hawthorn hedges in Stanthorpe was recently brought under my

notice by Inspector C. G. Williams. These hedges are growing in the Stanthorpe town area, and are very badly infested with San Jose scale. Constituting, as they do at present, a serious source of infection to adjacent orchards, they should be either effectively sprayed or destroyed.

Grasshopper Eggs (Cadicia Sp.).—Specimens of these eggs attached to wood of fruit trees have been sent to this Office from various localities in the Granite Belt. These flat oval eggs, laid symmetrically in rows on the young shoots of peach and apricot trees, &c., are the ova of a green grasshopper (*Cadicia Sp.*). The eggs hatch in the spring and so give rise to numerous little grasshoppers, and these, by devouring the foliage and gnawing the young fruit, do a good deal of damage. The shoots harbouring these eggs should, when found, be snipped off and destroyed.

A small black parasitic wasp is a valuable ally in keeping this grasshopper in check, as will be seen on examination of these eggs, when numerous small round holes made in many of them by the wasps in emerging, after having completed their work of destruction, will be met with.

Scolytid Beetle (Xyleborus solidus Eichf. ?).—Many plum and apricot trees that have died (probably owing to some fungus trouble, "Sour Sap," or bad drainage) exhibit in the trunk and branches small round holes each about one-sixteenth of an inch in diameter. These are thought, erroneously, by many orchardists to be the cause of the death of the host-tree.

These holes are made by a small wood-boring beetle (*Xyleborus sp.*). This little insect is not, as is often supposed, the primary cause of the host-tree dying. It, indeed, rarely makes its appearance until the tree is in a failing condition, or quite dead. It is particularly partial to apricot and plum trees, and although many specimens of their wood showing the work of this beetle have been submitted to me, I have not, as above suggested, so far found it doing any damage to healthy trees.

Cherry Wood-borer (?Maroga unipunctana, Donov. Cryptophagidæ).—This destructive moth-caterpillar has so far this season been rarely met with. In one instance, however, a three-year-old tree was completely rung around by its agency.

It usually makes its presence known by webbing over the injured part, covering the investing material with small particles of gnawed wood and frass (excreta). The insect is a night-feeder; one allied in habit may be found here in its native habitat boring in the wood of the honeysuckle (*Banksia sp.*). The moth is a very beautiful insect with white satiny wings; these, when expanded, measuring about $1\frac{1}{2}$ inches across.

Dried Apple Beetle (Doticus pestilans Olf.).—Several small dried apples were contributed by Mr. C. Warren, Thulimba, as harbouring maggots or grubs, and the latter on examination proved to be the larvæ of the dried apple beetle (*doticus pestilans—Anthribidæ*).

This little beetle is extremely partial to dried or mummified apples that have been left remaining on the trees. I have also found it in shrivelled peaches, boring into the stone in their case.

The beetle, about $\frac{1}{8}$ -inch long and brown in colour, is very active and flies readily.

It deposits its eggs on the dried apples or peaches (as the case may be) in late autumn, these eggs in due course giving rise to the grubs noticed.

I have never known this beetle to attack sound fruit.

Cup Moth (Doratifera vulnerans—Limacodidæ).—The cocoons of one of the cup or slug moths (*Doratifera sp.*) attached to the wood of James's seedling plum were brought to this Office by Mr. A. E. Pfunder, of Applethorpe.

The slug moth caterpillars are stout and thick-set (*i.e.* slug-like) in form, and have the extremities of the body produced into raised tubercles, each tufted with spines that come away and enter the skin when the insects are carelessly handled, causing sometimes much pain and irritation. The caterpillars devour the surface tissue of the leaves of the host-plant. This is, as far as I am aware, the first instance of a *Doratifera* larva being found in plum trees, although W. W. Froggatt and others record *Doratifera vulnerans* as attacking the foliage of the apricot. Usually, however, these peculiar caterpillars of deciduous fruit trees are to be found in the bush on various species of Eucalyptus, on whose leaves they feed, and it does not appear that the insect in question is likely to prove a pest of economic importance.

PLANT PATHOLOGY.

Several diseases of fungus origin, attacking deciduous fruit trees in the Granite Belt, have been forwarded to the Entomologist-in-Chief, Mr. Henry Tryon, who in his work is called upon to exercise a special knowledge of Plant Pathology.

One of these maladies, locally known as "Bark Canker" or "Scaly Bark," is very prevalent in the area mentioned on both pear and apple trees, and Mr. Tryon's identification of this disease and his report on the same will doubtless be of some interest to the district's orchardists. On this disease, whilst he treats of a second also, Mr. Tryon states as follows:—

Coniothecium Bark Canker.—With reference to the fruit-tree affections brought under notice in your communication of 28th ultimo and illustrated by specimens at the same time forwarded, I have to inform you as under:—

"(1) Apple.—Disease prevalent in apple, pear, and plum (and peach) wood all over district. Specimen apple from J. Sewell's orchard.

"This trouble, which is not uncommon in Stanthorpe orchards (in apple and pear), is immediately caused by a parasitic fungus *Coniothecium chromatosporum*, and may be termed Bark Blister rather than Bark Canker.

"The organism, that has dark brown mycelial threads, forms obscure dark cloudiness and spots in the dead cuticle and makes also the underlying tissue in which it thrives almost black also. These threads, again, course from cell to cell of the outer bark and replace their contents with closely packed-together short connected joints, the fungus finally producing masses of this short-jointed mycelium, whose divisions, by swelling, become spores, and on germinating eventually reproduce the organism.

"With the growth of the fungus in the outer bark the death of the latter ensues, this result being usually gradually realised. Apparently the parasite develops another phase form in which spores are produced in little receptacles known as *Phoma perithecia*.

"This disease also occurs in the pear, and on both it and the apple may do conspicuous injury by not only causing die-back, but by killing fairly large branches.

"Affected wood in which destructive changes are pronounced should be cut away and other parts treated with Bordeaux Mixture as soon as they are evidently affected, or may be in a condition to be so. Lime-sulphur should deter attack.

"Specimen No. 3 (Apple, J. Sewell).—Young wood, is an example of same disease.

"(Note.—That plum and peach trees are affected by the same disease is at least doubtful.)

"*Gloeosporium Bark Canker*—No. 2 Apple.—Die-back of graft (J. Sewell's orchard.)—The specimen exhibits an old wound extending inwards to the wood within a short distance of the cut end of the stock. (It is probable that the present noticeable development of the wound has been occasioned by the invasion of the fungus at the site of its occurrence.—H.T.) As the main course of the trouble the bark towards the top end of the latter, and which has merged with that of the scion in growth, has died through the attacks of a parasitic fungus *Gloeosporium malicortis*, that is now evident in the fruiting condition. The surface of the dead bark, in fact, is densely sprinkled over with small raised pustules, showing black-points, that have erupted through them, and that contain cavities (in a fungus stroma) in which the oblong spores are packed to ooze forth, when wet conditions obtain, to spread further trouble of the kind.

"This disease also affects the fruit at an earlier season of the year, causing the condition known as "Bitter Rot," and eventually results in mummified apples that, remaining on the trees, develop further disease on the wood (through infection, say, at the site of a wound); or, falling to the ground, infect the soil that on being applied to grafted stocks may cause trouble, such as has been remarked.

"It would be interesting to ascertain to what extent this trouble is prevalent in the Granite Belt. One would like to receive additional specimens from other local sources in order that this point may be elucidated.

"The use of fungicides, as advised with respect to the former—apple disease (*Coniothecium*)—is indicated; also the observance of orchard hygiene (picking up and destroying apples showing bitter fruit rot and gathering and burning mummy fruit."

CONCLUDING REMARKS.

I am indebted to the following orchardists for specimens and material received during the month:—Mr. A. E. Sewell and Mr. D. Pfunder, Applethorpe; Mr. A. Hall and Mr. A. H. Paget, the Summit; Mr. C. Warren, Thulimbah; Mr. M. Lucas, Beverley; Mr. J. Teitzel, Broadwater; Mr. A. E. Watts, Ballandean; Mr. J. McCook, Wyberba; and Mr. B. Watkinson, Stanthorpe.

It is, it need hardly be said, of great assistance to this Office (and, indirectly, to the Granite Belt fruitgrowing community) to receive from orchardists specimens of any insects, harmful or otherwise, that come under their notice, more particularly of those having any bearing on the fruit fly problem now being investigated.

SOME FACTS OF IMPORTANCE RELATING TO SHEEP MAGGOT FLIES.

BY PROFESSOR T. HARVEY JOHNSTON, University, Brisbane.

In an article published in this Journal in June, 1921, entitled "The Sheep Maggot Fly Problem in Queensland," the present writer presented a plan of proposed or suggested research work in connection with this important matter. Earlier in the current year (March, 1922) information was made public through the pages of this Journal relating to experimental work with the various chalcid wasps known to attack blowflies in this State. In the present article it is proposed to supply particulars regarding the duration of the various stages through which blowflies must pass in order to complete their life-cycle. The observations were made in Brisbane during a period of a full year, and a more detailed account of the investigation is being published by Mr. O. W. Tiegs and the writer in the "Proceedings of the Royal Society of Queensland" (1922, pages 77-104). The data contained in that paper have been freely utilised in the preparation of this article.

Any information ascertainable regarding the life history of blowflies is of value, as it may indicate the most suitable times or places in which to apply remedial measures. It should be emphasised that the observations were made in Brisbane (carriion being used as a food material for the maggot stages) and do not necessarily hold good for conditions in typical sheep country, more especially where flies are infesting sheep.

The insects particularly studied were the two species of "hairy maggot fly," viz., *Chrysomya albiceps* and *C. varipes*; the green bottle fly, *Lucilia sericata*; the grey flesh flies, *Sarcophaga* spp.; and the shining black blowfly, *Ophyra nigra*; while short notes are added regarding certain others, and information is supplied concerning the known range of flight of certain blowflies in the United States of America.

CHRYSOMYIA ALBICEPS.

This bluish-green fly is generally regarded as the chief sheep blowfly (the larger hairy maggot fly) and is more commonly known under the name of *Pycnosoma rufifacies*. Recent investigations have shown that it occurs commonly in India, where its larvæ live in carriion. Dr. W. S. Patton, who has devoted much time to the study of Indian blowflies, has quite recently stated that the maggots of this species are predatory, preying on and destroying the larvæ of other blowflies, amongst the eggs of which the female *albiceps* deposits her eggs. If this be the case, and provided the larvæ do not themselves cause myiasis, i.e., infestation of a living animal by fly maggots, then the insect regarded as the primary sheep blowfly in Australia would really be one which is assisting in controlling those flies (whatever they may be) which actually cause the injuries. Experiments have been planned with a view to ascertaining whether the observations recorded in India hold good for Queensland also. It is, of course, possible that the "hairy maggots" feed not only on the larvæ of other carriion-frequenting flies, but also on the inflamed diseased tissues of living sheep whose injuries may primarily have been caused by one or more species of blowfly (*Lucilia*, for example).

The egg was observed to hatch in 16 or 17 hours during summer, 18 or 19 in autumn and spring, and about 21 hours during winter. The time required when eggs are laid on the wool or in injuries on living sheep would, perhaps, be a little less than 16 hours during the height of a fly season. The resulting larva feeds for 4 or 5 days (sometimes 6) when in carriion, but probably for a shorter time when infesting living animals owing to more favourable conditions of temperature and moisture. Then it ceases taking nourishment and commonly wanders during this so-called prepupal period in order to reach a suitable place where it may undergo pupation, which frequently occurs well below the surface of the ground in the neighbourhood of the spot where it finished feeding. This preparatory or prepupal stage varies in length according to temperature and humidity being shortest ($1\frac{1}{2}$ to 3 days) in summer, lengthening to a week or 10 days in winter. Hence the total time passed in the larval stages varies from $5\frac{1}{2}$ to 8 days in summer to as much as 15 days in winter. The larva now become a pupa, from which after a period of 3 to 8 days in spring, summer, and early autumn, and 10 to 20 days during the rest of the year (say, May to September), the adult fly emerges, leaving an empty pupa-case or puparium behind. If we add together the length of these various periods (egg, larval, prepupal, and pupal), we ascertain the length of time which elapses between the deposition of the eggs by a female fly and the emergence of the flies which have ultimately developed from such eggs. This period was found to be shortest during February, our minimal observation being between 9 and 10 days, which agrees with what Dr. Illingworth reported as having noticed during midsummer in Hawaii. The time noted as being

required in Brisbane varied from 9 to 14 days in midsummer (December to March), lengthening in spring and autumn to from 13 to 17 days and in winter to a period of from 3 to 5 weeks. E. Jarvis indicated that 11 days were needed in Longreach in October, with an average mean temperature of 75.5 degrees Fahrenheit, the combined egg and larval stages requiring 7 days and the pupal stage 4. We found that in Brisbane during the dry month of October 13 days were needed for these periods. Mr. Froggatt reported that less than a fortnight was required in New South Wales (presumably during summer).

The writer ventures to express the opinion that, when bred in living sheep, the period between egg-deposition and fly-emergence in Queensland sheep country will probably be between 9 days and a fortnight, except during the dry season, when the pupal stage will be prolonged for an additional 7 to 14 days, as it will be subject to atmospheric and ground conditions, so that the full period may then be between a fortnight and a month. The very rapid increase in the number of flies soon after rain is almost certainly mainly due to the influence of moisture on the pupæ, which then rapidly complete their metamorphosis, and emergence occurs; hence abundance of flies soon make an appearance.

We cannot give definite information as to the length of time required to elapse after emergence before these flies begin to lay eggs, though 5 or 6 days seem to be needed. If these figures be correct, then during the hot moist midsummer months one may expect a new generation of flies in from 14 to 21 days. In other words, the short period of from 2 to 3 weeks would be sufficient to allow the laying of eggs by a mother fly and egg deposition by her daughter which developed from such eggs.

We do not know how many batches of eggs, nor how many eggs in each batch are laid; nor do we know how long the adult fly may live under natural conditions, but it was ascertained that when bred in captivity in Brisbane they could live for at least 30 days, though 15 to 26 days represented the more usual period. Flies generally live a shorter time during warm weather when their activity is greatest, but in our observations no marked difference was noted in regard to this particular species.

CHRYSOMYIA VARIPES.

The small greenish blowfly whose larva is the lesser hairy maggot is more commonly known in this State as *Pycnosoma varipes*. It frequents carrion. Its eggs require from 17 to 19 hours to hatch (October to April). The larva, whose habits are similar to those of the preceding species, feeds for a period ranging from less than 3 days to 5 days, the shortest periods being during January and February, and 4 to 5 days during the remainder of the year. Then follows a prepupal period of one to two days in summer, lengthening to a week or more in winter, so that the total time occupied by the larval stages ranges from 4 to 7 days in summer and upwards to 13 during winter. The succeeding pupal condition requires from 2 to 5 days (usually 4) in suitable situations in summer, and as much as 1 to 3 months in winter. Thus the combined egg, larval, prepupal, and pupal stages—i.e., the time from egg-deposition to the emergence of the fly—may be as short as 8 days in February (8 to 14 days in summer), lengthening to 2, 3 or even 5 weeks, as the temperature and humidity fall.

As in the case of *C. albiceps*, we do not know what period elapses before the emerging fly can lay eggs, nor how many batches are laid. It was ascertained that in captivity the adult fly could live from 19 to 20 days throughout the year, a period similar to that recorded above for the related fly. It should be mentioned that, as far as was observed, there was no attempt at pairing in either case during captivity.

LUCILIA SERICATA.

The "green bottle" flies, which are readily attracted to carrion and house refuse in our Australian cities, are generally regarded as belonging to the above-named species. Amongst the other species of this genus known to occur in Queensland there might be mentioned *L. solais* and *L. fuscina*. *L. caesar* has been reported from New South Wales. We find that at least two species are common in Brisbane. The name *L. sericata* is provisionally accepted as designating the commonest species met with locally, and the following data relate to it:—

Eggs hatch in from 16 to 18 hours during summer, but rather longer (up to 24 hours) when conditions are either drier or colder. The larva, when bred in carrion, feeds for 4 or 5 days, sometimes 6, then wanders away, and after a lapse of from 2 to 5 days more (excepting during winter, when as much as 3 weeks may elapse) it passes into the pupal condition, in which it remains for from 6 to 8 days (ranging to 17 in winter). The fly, then, emerges in from 12 to 16 days, usually 13, from the time that the egg was laid, except during winter, when as long as 4 weeks may be needed.

From 6 to 10 days after emergence, pairing occurs and eggs are laid two days afterwards. It will be seen from these data that it is possible for a complete generation to be passed through in about 20 days under midsummer conditions in Brisbane, but judging from the findings of Bishopp and Laake, who reported that egg-laying may take place in Texas, U.S.A., in from 4 to 21 days after emergence, it is likely that the minimum period in Brisbane may be 3 or 4 days less than that observed by us; in other words, in 16 or 17 days.

Specimens bred and maintained by us in captivity lived from 12 to 36 days in summer, as well as in winter. Froggatt observed that during midsummer in N.S.W. 12 or 13 days were required between egg-deposition and fly-emergence, his observation agreeing with our own in regard to Brisbane summer. Similar periods were registered during summer in Texas, U.S.A., but it was found that in winter these became greatly lengthened and from 4 to 6 months were needed, owing to the colder winter climate. A similar result would no doubt be obtained under similar climatic conditions in Australia, the winter being passed through by means of prolonged larval and pupal stages.

LUCILIA CAESAR.

Lucilia caesar, which is reported to occur in this continent, has been found to be able to pass through its stages from the egg to the emerging fly in from 9 to 21 days during warm weather in Eastern Texas, U.S.A., and from 16 to 60 (generally 24) days in San Francisco, and to commence egg-laying in from 5 to 9 days after emergence, so that a complete generation may be passed through in a climate which more or less resembles that of Sydney in 15 or 16 days. No doubt, in Brisbane, if the fly occurs here, the required time would be probably less. The similarity in regard to the minimal time for these two species, *L. caesar* and *L. sericata* is noteworthy.

OTHER COMMON BLOWFLIES.

Calliphora augur (*C. oceaniae*).—This is the smaller of the two common blowflies met with, even in houses, especially during winter and spring in Brisbane. It may be recognised by the greenish-blue colouration of the upper part of the abdomen. It may either deposit maggots or lay eggs. In the latter case hatching may occur in a few minutes or may take as long as 6 hours, perhaps longer. The larvæ feed for 4 or 5 days; then follows a prepupal stage of 4 to 8 days, succeeded by a pupal stage of from 10 to 19 days, so that the length of time elapsing between the deposition of an egg or a larva and the emergence of the blowfly is about 18 to 20 days, but may extend to as much as 33 during winter in Brisbane. Froggatt reported that in N.S.W. during summer 14 to 18 days were needed, while in winter a period of from 6 weeks to 2 or 3 months was required.

Neopollenia stygia (*C. villosa*).—This is the rather large blowfly, dark-greyish in general appearance, but with a distinct golden colour on the lower surface of the abdomen. It is common in the vicinity of houses and will readily enter. Eggs are laid, but no details are available regarding the length of time required by the fly to pass through its different stages, though Mr. Froggatt ascertained that a fortnight was the average time needed in summer in N.S.W. from egg-laying to emergence.

Sarcophaga spp.—The flesh flies, which somewhat resemble overgrown house flies, differ in having on the thorax three instead of four dark stripes, and these are separated by grey, silvery, or golden colouration. We have ascertained that in Brisbane the larvæ feed during summer for from 3 to 6 days and for a week in winter. Then follows a prepupal stage of 2 or 3 days (7 to 9 or more in winter) and a pupal of from 5 to 9 days in summer, lengthening greatly during winter, as long as 16 weeks having been required in one of our experiments. The total time which elapses between the deposition of maggots by the parent and the emergence of the resulting fly is between 12 and 18 days in summer, but lengthening to many weeks and even to several months during winter, on account of the extension of the pupal period. In about 11 days after emergence flies begin to larviposit, so that during summer a new generation, *i.e.*, from the birth of the mother to the birth of the first offspring, may be produced in 3 to 4 weeks.

Ophyra nigra.—The rather small, shining, black blowfly which bears this name very commonly visits carrion in Eastern Australia. In Brisbane its eggs hatch in about a day, larvæ feed for 5 or 6 days, and then there follows a prepupal stage of from 7 to 11 days in summer, lengthening to 3 or 4 weeks during winter. The pupal condition is passed through in about a week in summer, but 2 or 3 weeks are needed in winter. Thus the time required for full development from the egg to the newly-emerged fly is about 3 weeks in summer, 4 weeks in autumn and spring, and as much as 10 weeks may be needed in winter. In from 5 to 7 days after emergence egg-laying begins, so that a complete generation is passed through during summer in Brisbane in from 24 to 37 days. Adults were found to live from 3 to 4 weeks in captivity after emergence.

Related to the two blowflies first treated of in this article is the well-known American screw-worm fly, *Chrysomya macellaria*, which readily attacks and deposits its eggs in domesticated animals as well as man, besides ovipositing in carrion. It passes through its combined egg and larval stages much more rapidly when infesting live cattle or sheep (4 to 5 days) than when in carrion (6 to 20 days). Then the maggots leave their food material and make their way below the soil to pupate, just as the majority of Australian sheep maggot flies do at this stage. After a pupal stage of from 3 to 14 days the flies emerge, and are capable of laying eggs in from 3 to 18 days. Consequently the whole life cycle from the egg to the emerging adult can be completed in a little more than a week under optimum conditions of temperature and humidity, such as obtain when the eggs and larvæ develop in living animals, while from flies so bred the period elapsing between egg-laying by a parent and egg-laying by the progeny of such eggs may be as short as 10 days. Bishopp stated that eight consecutive egg-depositions by one fly had been observed, the intervals being from 1 to 7 days; that under most suitable conditions batches were laid at intervals of 2 to 4 days; that the number of eggs laid in each batch varied from 40 to 248; that the greatest number recorded as laid by one fly was 1,228; and that there appeared to be from 10 to 14 broods each season in Southern Texas.

It would be of interest to possess accurate data regarding the length of the life-cycle of the Australian sheep maggot flies, when developing in or on living animals. In the light of our present knowledge effective treatment of blown sheep once a week would be sufficient if the medicament applied were such that its larvicidal action soon disappeared. This would probably be an expensive proceeding. It has been claimed that certain arsenic-containing mixtures now utilised remain effective for a considerable time, and that they not only destroy any larvæ present when the solution is applied but the poisonous action is exerted against the larvæ as they emerge from such eggs as may be laid subsequently on the poisoned wool.

FLIGHT OF BLOWFLIES.

Two matters of importance in connection with any serious attempt to control flies, whether they be house flies in a town or blowflies in fly-infested sheep districts, are a knowledge, firstly, of their favourite breeding-places and secondly, of the distance which such flies can travel whether with the wind, across it, or against it. We know that blowflies breed chiefly in carrion and various forms of refuse containing animal matter; consequently prompt destruction of all such material would bring about the control of blowfly infestation.

When dealing with the American screw-worm fly, Bishopp stated in 1915 that, after careful estimation, he considered that the carcass of one cow might produce upwards of a million of these flies. One may safely assume that a dead sheep can provide sufficient food to rear some thousands of blowflies under Australian conditions, especially if the atmosphere be warm and moist. It is of importance, then, to know the maximum range of flight of such insects. No information has been published regarding experimental work to determine the distances in Australia. Consequently, one can only draw attention to results obtained elsewhere.

Bishopp and Laake, using a series of traps arranged at varying distances approximately north, east, south, and west from a centre in a town in Eastern Texas, U.S.A., reported that suitably marked blowflies were recovered at the following maximum distances from the point of release:—*Chrysomya macellaria* (screw-worm fly) 15.1 miles, *Phormia* 10.9 miles, *Lucilia sericata* 1.2 miles, *L. caesar* 3.5 miles, *Synthesiomia brasiliensis* $\frac{1}{2}$ -mile, *Sarcophaga* spp. 3 miles, *Ophyra* sp. 7 miles. The first-named is related to the Australian hairy-maggot flies which infest sheep, the third, fourth, and fifth species occur in Australia, as do species of the last-named two genera. We may then safely assume that Australian blowflies can fly for many miles from the place where emergence takes place. American observations showed that such dispersion occurred in all directions, and that though the chief stimuli inducing such dispersion seemed to be the desire for food and the desire for suitable breeding places, yet there was also a strong migratory instinct independent of these, especially in the case of *Chrysomya*. Widespread dispersion might be readily effected as many specimens of the last-named were caught in traps 8 miles distant in all directions from the point of release in less than 24 hours afterwards, and 10 miles in less than 48 hours. Even the house fly was found to be able to travel more than 6 miles in less than 24 hours, and the maximum distance from the point of release at which the species was collected was a little over 13 miles, while numerous specimens were recaptured at very considerable distances away, even when the position of the trap in which they were caught necessitated flight in some cases across the wind and in others against it. Marked flies were recaptured by these authors as late as 17 days after release in the case of *Chrysomya*, 15 days in the case of the house fly, 6 to 8 days for *Ophyra*, and 11 to 12 days for *Sarcophaga*.

From the results of these carefully planned experiments one can readily understand the possibility of the flock of a sheep owner who assiduously destroys all

carcasses and other fly-breeding material on his property becoming attacked by maggot-flies which have been bred from carrion many miles away. These facts should emphasise the need for continuous and concerted action by pastoralists against the breeding places of such flies. The writer does not desire to belittle in any way the excellent work being done in Queensland in connection with the treatment of sheep by dipping, jetting, spraying, &c., with some arsenical solution to protect them against fly infestation, but none of these methods attacks the root of the trouble. The poison applied no doubt destroys great numbers of flies while they are still in their early developmental stages (egg and larva), but the effect when compared with the enormous numbers of the pest can be but slight. One must not forget the extremely important part which climate plays in controlling or in increasing the blowfly population in any particular district. Climate may render the breeding material suitable or unsuitable, and besides it greatly influences the duration of the various stages through which flies must pass.

In this article no reference is made to utilisation of natural enemies of blowflies, such as the various parasitic wasps, since that aspect was dealt with by the writer in an article which appeared in this journal some months ago.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF AUGUST IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING AUGUST 1922 AND 1921 FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Aug.	No. of Years' Records.	Aug., 1922.	Aug., 1921.		Aug.	No. of Years' Records.	Aug., 1922.	Aug., 1921.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
Atherton	In. 0·89	21	In. 0·13	0·92	Nambour	In. 2·04	26	In. 0·77	1·63
Cairns	1·81	40	0·54	1·44	Nanango	1·47	40	0·58	0·45
Cardwell	1·34	50	0·18	1·38	Rockhampton ...	1·07	35	0·73	2·66
Cooktown	1·39	46	0·24	0·97	Woodford	1·20	35	0·58	1·07
Herberton	0·70	35	0·12	0·61					
Ingham	1·44	30	0·10	1·82					
Innisfail	5·37	41	1·53	3·74					
Mossman	1·35	14	...	0·79					
Townsville	0·48	51	Nil	0·16					
<i>Central Coast.</i>					<i>Darling Downs.</i>				
Ayr	0·56	35	Nil	0·41	Dalby	1·26	52	0·36	0·37
Bowen	0·72	51	Nil	0·35	Emu Vale	1·23	26	0·46	0·36
Charters Towers ...	0·51	40	Nil	0·64	Jimbour	1·33	34	0·35	0·94
Mackay	1·08	51	0·02	0·91	Miles	1·25	37	Nil	0·60
Proserpine	1·43	19	Nil	3·73	Stanthorpe	1·88	49	0·54	0·18
St. Lawrence	0·93	51	Nil	0·62	Toowoomba	1·79	50	0·49	0·84
					Warwick	1·57	57	0·50	0·50
<i>South Coast.</i>					<i>Maranoa.</i>				
Biggenden	1·23	23	0·49	1·59	Roma	0·98	48	Nil	0·83
Bandaberg	1·40	39	1·10	0·85					
Brisbane	2·14	71	0·16	0·41					
Childers	1·30	27	2·03	1·45					
Crohamhurst	2·32	30	1·18	1·45					
Esk	1·62	35	0·52	0·54					
Gayndah	1·26	51	0·51	0·59					
Gympie	1·88	52	0·15	1·30					
Glasshouse M'tains	1·66	14	0·87	1·45					
Kilkiwan	1·60	43	0·71	1·05					
Maryborough	1·79	51	0·45	1·02					
					<i>State Farms, &c.</i>				
					Bungeworgorai ...	1·00	8	Nil	0·69
					Gatton College ...	1·25	23	0·21	0·22
					Gindie	0·82	23	Nil	1·05
					Hermitage	1·46	16	0·49	0·27
					Kairi	1·20	8	0·18	1·25
					Sugar Experiment Station, Mackay	0·99	25	0·05	0·64
					Warren	1·16	8	...	1·31

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for August this year, and for the same period of 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE E. BOND, State Meteorologist.

CANE PEST COMBAT AND CONTROL.

The Entomologist to the Sugar Bureau at Meringa, near Cairns (Mr. E. Jarvis), reports as follows for August, 1922.

CANE PESTS ON THE HERBERT RIVER.

A special visit of inquiry was paid to this district towards the middle of this month, with the object of reporting on various cane affections.

Rats and Gumming Disease appear to be doing most damage, but considerable injury is being caused also by cane-grubs and borers. Owing to co-operation on the part of the managers of the Victoria and Macknade mills I was enabled to get over the ground quickly, and so make the most of the limited time available. Interesting evidence bearing on the subject in question was obtained from the secretaries of the Herbert River and Macknade Farmers' Associations, and from Mr. Stephenson, of the Macknade mill, whose cordial assistance was much appreciated. Much of the information gathered will be found embodied in the following notes.

INJURY BY RATS.

This pest, which appears to be most plentiful on the Victoria mill side of the river, is said to be responsible for injuries second only, if not equal, to those caused by gumming disease, the loss from rats last year in the Victoria mill area being estimated, Mr. Thornton tells me, at £30,000 sterling. The rats breed mostly in swampy lands and creek beds, being most numerous on selections adjoining such places, more especially where the headlands are narrow in width and allowed to get very weedy. Unfortunately, they attack by preference the softer varieties containing most sugar, and by gnawing deeply into the basal portion of sticks will sometimes, when feeding among a heavy crop, bring to the ground in a single night scattered areas of cane of considerable extent. An offensive campaign has been started by the C.S.R. Company, under the superintendence of Mr. Stephenson, the plan of procedure being to distribute poison-baits manufactured by the Company to a number of controllers in the various rat-infested districts. These are supplied with a list of growers to receive the poison, and in the Macknade area a man acting under the controller's direction goes from farm to farm, systematically, laying the baits. Although supplied free of cost, many growers will not take the trouble to do the work themselves, unless their cane happens to be severely attacked. Many different poisons are being tried, but phosphorous bait is thought to have given the best result so far. To prepare a good bait of this description, dissolve 2 oz. of phosphorous in 50 oz. of boiling water; stir in slowly 40 oz. of flour, and when the mixture is almost cold add, while still tepid, 40 oz. molten tallow and 20 oz. sugar. Definite evidence with regard to the effect of these poisons is not always forthcoming, dead rats being seldom found, but I believe good work is being done, although we cannot expect to see any very decided results within a few months after application.

Control Methods.—Briefly, these should consist in such commonsense methods as—(1) leaving wide headlands and keeping them clean; (2) poisoning the rats, especially on infested blocks when nearly cut out, and during November and December, when rats are forced to congregate on smaller areas of uncut cane; and (3) cleaning up breeding haunts, when possible, in the immediate vicinity of plantations.

Experimentation with poisonous compositions should be continued with a view to the discovery of a more deadly, yet palatable, bait than those being tried at present. In this phase of the work we shall be pleased to co-operate with the C.S.R. Company.

GUMMING DISEASE.

This well-known bacterial disease is prevalent, Mr. Stephenson tells me, throughout the Herbert River district, occurring for the most part in Clark's Seedling (H.Q. 426). As this cane matures in about 11 months, is rich in sugar, and generally yields a heavy crop, it is naturally a favourite, and is grown here more than any other variety. A map of the gummed area is being prepared, and this should furnish interesting data regarding the porosity, drainage, &c., of the various soils affected. Good crops of gummed cane can be obtained, providing the trouble does not start during early growth. Unfortunately, however, the Badila is already affected, and it is feared may become more so as time goes on, unless Clark's Seedling can be quickly replaced by some variety less susceptible to the disease.

The variety H.Q. 409, although practically immune from gumming, is unpopular here because of its slow growth and tendency to arrow freely and very early. It appears, however, to be a heavy bearer, as from twenty-five to thirty sticks are often obtained from sets that have been planted 18 inches apart. Mr. Geeson tells me that he has grown as many as fifty-seven canes in a single stool of this variety.

Remedial Measures.—It is generally admitted that the chief factors responsible for the occurrence of gumming disease (*Bacillus vascularum*) are:—(1) Poor drainage; (2) an impervious subsoil within 2 or 3 feet from the surface; (3) defective cultural methods; and (4) an abundant rainfall. Topographical conditions, the physical nature of the land, and general texture of the soil, are supposed to exert no influence on its development.

According to Professor Cobb, this one condition of drainage has a most important bearing on the prevalence of gumming disease, and he recommends a rotation of crops, where possible, on land that has been long under susceptible varieties of cane.

A good instance of the benefit to be derived from proper drainage was brought under my notice at Halifax. The farm in question comprises about 60 acres situated on the river bank, and divided by a road into two equal portions. On one of these, which adjoins the river, good crops have always been obtained, while the cane on the other portion, bounded on the far side by a swamp, has invariably either failed or been scarcely worth cutting. Three different selectors were unable to do anything with this latter portion, but the present owner has succeeded in raising a fine crop of cane uniform in height throughout. This was effected simply by cutting a few deep main drains through the block emptying on to the swampy land, and running cross drains into them. The improvement of canes by selection, and the planting of immune or but slightly susceptible varieties is, of course, advisable, and I understand that the Company have this matter in hand. Less volunteering and the use of green manures would probably also tend to reduce the chances of gumming.

Little or no attention is being given to the selection of clean cane for planting, it being the practice on some selections to place whole sticks in the drills, and before covering chop them through here and there as they lie in the soil. Needless to say, such lax methods of planting are very unsatisfactory from an economic standpoint, as borer, gumming, or other diseases would thus escape notice altogether and have a good chance of spreading to clean areas. This factor is of primary importance, since it will be of no avail to thoroughly work and drain the soil unless clean sets are afterwards planted. Burning the trash has been recommended, as this gets rid of countless numbers of bacteria, spores of fungi, beetle borers, &c.

PEST DESTRUCTION FUND.

Grubs have been very troublesome in places. Collecting the beetles was discontinued at Cordelia about five years ago, with the result that during 1920 considerable losses were experienced, these becoming worse the following year (1921). During the present season, the damage in this district has been very severe, and I understand that collecting at Cordelia will be taken up again. At Macknade and Ripple Creek the growers pay so much per acre (up to 150 acres only) into the fund, the amount varying from 1s. 6d. to 2s. This method of payment is considered to be better than that of fixing the amount at so much per ton of cane. Naturally, the aim of both small and big farmers would be to produce as much cane as possible per acre, and so decrease the amount of the levy; thus a 24-ton crop at 2s. per acre would cost one penny per ton to protect from grubs, whilst a 36-ton crop at the same rate would mean a reduction to three-farthings per ton, and so on. In order to achieve this result, better methods of drainage, cultivation, seed selection, &c., would have to be adopted, meaning not only heavier crops but also minimum losses from gumming, grubs, and other diseases.

Beetles are paid for by the quart; 1s. for greybacks and 2s. for golden beetles. Last season, at Ripple Creek, 8,367 quarts were collected, costing £418 7s.; and at Macknade £280 5s. 9d. was paid for 5,618 quarts. Receivers get 5 per cent. of the cost of all beetles handled. Growers here are not slow to recognise the value of this controlling factor, since at Ripple Creek last year only two farmers objected to contribute to the fund, and at Macknade every grower subscribed to it. Beetles are caught during the first three weeks following emergence, and collecting commences directly they appear on the wing. In a general way grubs will attack most varieties of cane, but the stronger-rooting kinds are most resistant, as they do not go over so easily. Mr. Geeson planted a patch of Black Innis and Badila side by side, and found that the latter was badly attacked, while the Black Innis was not appreciably injured.

PARASITE OF BEETLE BORER.

The cane borer (*Elabdoenemis obscurus* Boisd.) appears to be spreading on the Herbert River, although occurring at present mostly in the basal portions of canes. Rat-eaten sticks are very liable to become infested, as the beetles oviposit by preference in soft places where the rind has been gnawed off by rats.

The C.S.R. Company have established a breeding-cage at Macknade for rearing tachinid fly parasites, and I made arrangements with the Secretary of Macknade Farmers' Association to collaborate with them in this useful work, if necessary, in order that the parasites might have a better chance of spreading throughout the district with as little delay as possible. Mr. Stephenson is in control of the cage at Macknade, and has already bred and liberated a number of flies. In this connection it may be mentioned that tachinid parasites are at present emerging freely in our breeding-cages at Meringa Laboratory, and on the 25th instant 60 specimens (mostly females) were liberated by us among bored cane at South Johnstone, and three days later another lot of 25 were let go at Aloomba.

WHITE ANTS ATTACKING SUGAR-CANE.

Destruction of cane sets at Gordonvale by two species of white ants (*Termes meridionalis*, and *Eutermes fumigatus*) was first recorded by the writer in Bulletin No. 3 of this Office. The damage, however, occurred mostly in ground brought under cultivation for the first time, and is of minor economic importance. In such cases the presence of this pest is doubtless due to affected roots of big trees having been left ungrubbed.

I was much interested to learn from Mr. Geeson that a small species of termite is known to attack cane sets planted in well-worked land at Macknade. In one instance patches of cane affected in this way were found to be distributed over a field that had been under cultivation for the past thirty years.

THE BANANA BEETLE BORER.—III.

By JOHN L. FROGGATT, B.Sc.

Mr. Froggatt's first progress report appeared in the September issue, 1921 (vol. xvi., pp. 200-208). A second progress report was published in the May Journal, 1922 (vol. xvii., p. 240). The observations and conclusions embodied in the following report cover the period from January to July, 1922, inclusive.

The importance of the Banana Beetle Borer problem in its relation to the continued welfare of the banana-growing industry of Queensland is gradually becoming recognised, with the result that our knowledge of the distribution of the pest has been considerably augmented during the last six months. It is still, however, far from complete, and so long as our knowledge remains in this state the work of controlling or even checking the pest will be severely handicapped. We can definitely state that certain areas are infested by beetle borer, but it is extremely problematical whether we can say that even some of the other areas are free from this pest.

During the last six months banana beetle borer infestation has been found to be bad in three districts, slight in a fourth, and suspected in a fifth district from which it had not been previously recorded. It is too big an undertaking under existing conditions for even a small body of men, and still more so for individuals, to thoroughly examine every banana plantation in the State within a reasonable time in order to determine the presence or absence of banana beetle borer therein. The greatest difficulty is met with to induce a grower to admit that he has an infested plantation: rather is the short-sighted policy of "hush it up" preferred. The pest has to be coped with, and the sooner the better. It therefore behoves growers and their associations to assist the investigations by co-operating, rather than hampering them by standing aloof. Great assistance has been rendered by some growers, and their co-operation has been of great service and greatly appreciated.

THE EGG.

Further observations prove that the site for the deposition of the egg most generally favoured in standing plants is just about ground-level, the egg lying just underneath the surface of the plant. A few instances have been noted in which the eggs had been laid below the surface of the soil, more particularly in the suckers. In stems and corms lying on the ground the eggs were almost invariably laid on the underside.

Laboratory observations showed oviposition to be active up to the beginning of June, being highest in March, remaining high in April, and decreasing in May. With the advent of cold weather the number of eggs deposited decreased most markedly. Information obtained in the field corroborated these observations.

These data support the hypothesis that extremes of heat and cold decrease egg-development in a similar manner.

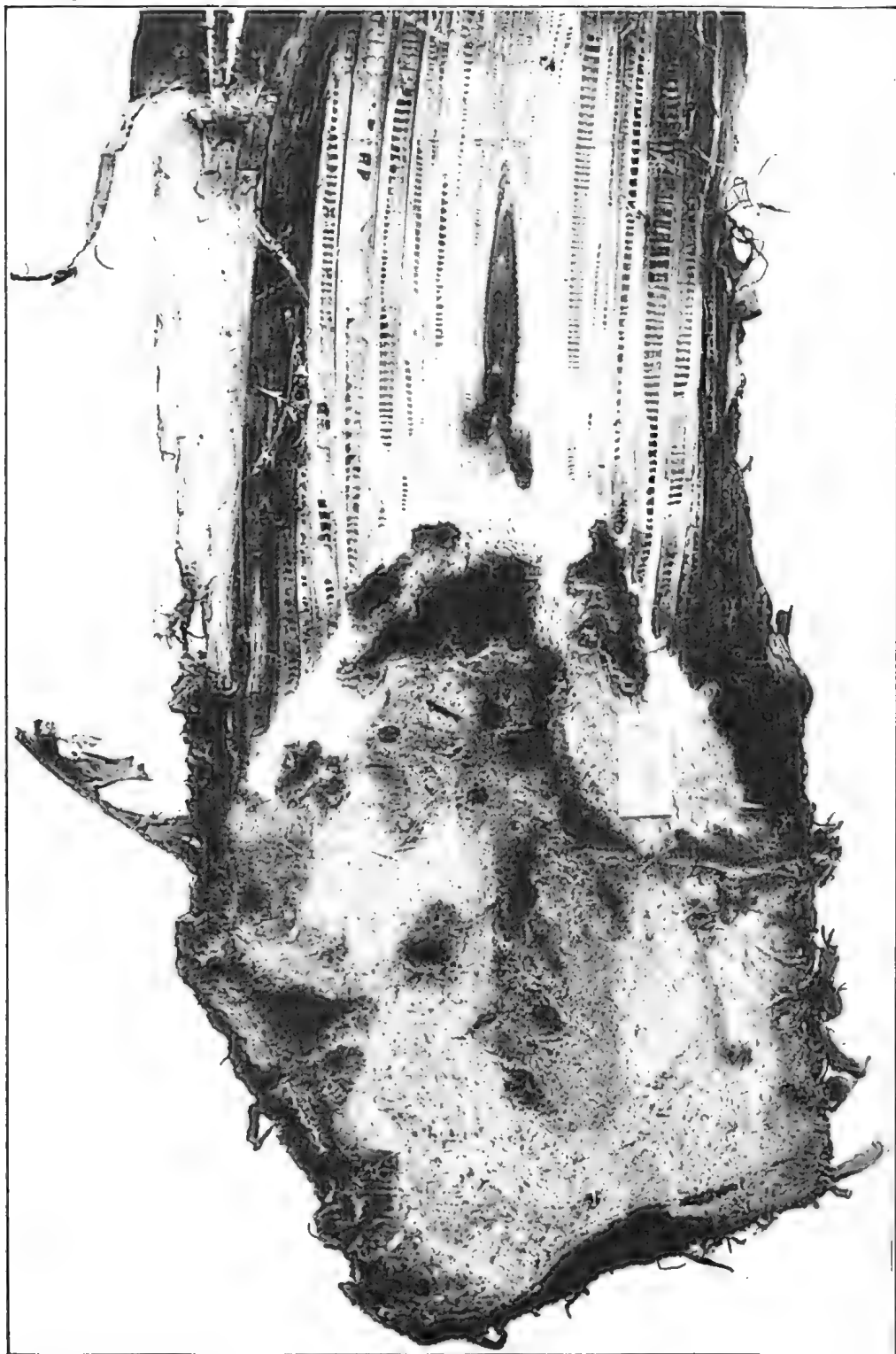


Photo : Dept. Agriculture and Stock.]

PLATE 54.—BUTT OF BANANA PLANT

Showing effect of infestation by *C. sordidus*. Scale, 2 centimetres (2 cent. = 1 inch).
Note—(1) tunnelling in outer part of corm ; (2) plant decay spreading from grub tunnels in centre of corm ; (3) destruction of central core of plant by grubs.

Oviposition, though existent throughout the life of the female beetle, is more active in the early stages than in the later ones of this. In no case were two or more eggs found in the one cavity.

The totals of egg counts from the imagoes under observation (*see* Table D) are given in Table A. When comparing the number deposited with the number of beetles in each lot, it must not be forgotten that only a portion of the beetles were females. It is then obvious that a few beetles in a plantation will very rapidly increase to sufficiently large numbers as to cause appreciable damage.

All the observations tend to prove that the development of eggs in the ovaries of the females is not divided into periods for the production of one batch at a time, but that the process is continuous, the individual eggs being deposited as they are developed.

The period passed in this stage of the life cycle has shown wide variations under different climatic conditions. The minimum period noted was four to five days, with eggs laid between 25th January, 1922, and 1st February, 1922. Those laid up to 28th April, 1922, matured in an average of eight to nine days. Eggs deposited in the latter end of May, 1922, showed a marked increase to 27-31 days for the developmental period, while those laid early in July took 34 days to mature. Progressive average results are given in Table B.

LARVA AND PUPA.

As the larva (or grub) approaches maturity, it tunnels towards the outer margin of the bulb and comes to rest just underneath the surface. Before changing into the pupa (or chrysalis) it lies dormant for a time, exhibiting but little powers of movement if disturbed. The body becomes flaccid and elongated, losing the typical shape of the larva of this species.

Since it has not always been possible to ascertain the periods passed in the larval and pupal stages separately, these have been combined in the calculations. With eggs laid in March, 1922, the larval and pupal periods occupied an average of 34 to 46 days (min. 26; max. 48), and with those laid in April, 1922, these combined periods increased to an average of 68-76 days (min. 67; max. 78).

In the plant in the stool a considerable amount of the tunnelling by the grubs is done in the peripheral portion of the bulb. It is during this time that the greatest amount of harm is caused to the plant, because many root origins are damaged, if not destroyed, by the larva in its passage through the corm, not only then causing loss of sustenance to the plant, but also indirectly depriving it of sufficient support in the soil on account of the damaged and destroyed root origins leading to decay of these organs in their entirety. Decay of the plant tissue often follows, and spreads out from the grub tunnels, thus causing still further destruction of the bulb of the plant.

In stems the principal part traversed by the larvæ is the central core.

Pupæ were found in corms in the field on 30th July, 1922.

THE IMAGO (OR BEETLE).

There is no doubt that the beetle moves beneath the surface of the ground, even by day, but it has the strongest abhorrence of light, this being more marked with bright than with dull lights.

Although no positive proof has yet been established of the powers of flight of the beetle, it is possible that they exercise this power of migration only at a certain time of year.

During the colder portion of the year the beetles are particularly sluggish. In July, 1922, a large number of imagoes was found in old larval tunnels in the corm of standing plants, where they were apparently sheltering; in every case an opening on to the surface of the bulb was present, communicating with the larval tunnels, and a greater number was present in these situations than could have bred in the bulbs, as shown by the amount of tunnelling.

Beetles have been found clinging to the bottom of plants standing in the stools, showing that in these situations, at any rate, they will burrow several inches below ground level.

Beetles, emerging from pupæ between 16th and 20th April, 1922, deposited fertile eggs between 26th and 29th May, 1922, giving a period of 36 to 43 days from emergence to mating and oviposition. These imagoes were bred from eggs deposited between 1st and 13th March, 1922, thus giving the period from oviposition to oviposition by the beetles bred-out as 72 to 92 days.

In the case of eggs laid between 8th February, 1922, and 13th March, 1922, the full life cycle (deposition of egg to emergence of beetle) averaged 42.5 days to 51.25 days, and with those laid between 10th and 18th April, 1922, the cycle occupied an average of 78 to 83 days.



Photo : Dept. Agriculture and Stock.]

PLATE 55.—INFESTED BANANA SUCKER, SHOWING APPEARANCE OF PLANT.



Photo : Dept. Agriculture and Stock.]

PLATE 56.—INFESTED BANANA SUCKER, SHOWING APPEARANCE OF PLANT AND GRUB TUNNELS IN CORM.

Continued observations on the length of life of the beetles show that it is a very long one. In the series under observation, twelve lots have died out, yielding rather remarkable results. The imagos in five of these lots were collected in the field, and those in the other seven lots were bred between November, 1921, and January, 1922, from eggs laid in the office. Those collected in the field gave an average maximum length of life of 412.2 days to 420.2 days, while those bred out had an average maximum of 170 to 183.8 days. The longest life was shown in Lot B, 448 to 453 days. A single beetle bred in the office on 13th June, 1921, from a pupa collected in the field, lived for 365 to 368 days. This one was kept solitary for the whole period of its life.

The comparatively short life of the imagos in the seven lots quoted above is difficult to account for, as they were all kept under exactly similar conditions to the rest of the beetles. Details of the longevity of these imagos are given in Table C.

Of the remainder of this series the imagos in Lot E had a maximum length of life of 461 to 464 days to 31st July, 1922, and had not died out. These imagos were bred in the office from pupæ collected in the field. Progressive observations in the series in continuation of those given in the writer's second report, are appended in Table D. Those lots marked with an asterisk were bred in the office from pupæ.

A large number of tests have been made with different chemicals in order to ascertain what means can be employed for poisoning the beetles through the medium of baits. Banana corm has been used as the bait in all the experiments carried out to date. Both solutions and dry powders were used at different dilutions.

In each series of the "solution" tests three strengths of the solution were used. Pieces of corm were steeped in each strength for periods of time varying from one to twenty minutes, ten beetles being exposed continuously to each soaking of corm in each strength of solution for varying periods of time. In this way the optimum strength of solution and period for steeping the bait, as well as the period of exposure required to kill the beetles, were indicated from the one series.

In all the series of "dry powder" tests, the procedure was similar to that just given, except that one strength of the active principle was taken, and the pieces of corm were shaken up in the powder for periods varying from five to twenty minutes.

The tests were carried out in tins 4 inches by 3 inches by 2 inches, with lids, containing a little sifted soil in the bottom. At the expiration of the period of exposure of the treated material fresh corm was substituted for the pieces the beetles had been feeding on.

The chemicals tested to date are as follows:—

- Sodium arsenite in solution and as a dry powder.
- Mercuric chloride (corrosive sublimate) in solution.
- Barium chloride in solution.
- Lead arsenate as a dry powder.
- "Paris green" as a dry powder.
- Calcium arsenate as a dry powder.
- Borax as a dry powder.

In some of the dry powder series wheaten flour was mixed with the chemical as a diluent.

The dry powders gave more satisfactory results than the solutions, as a general rule. Paris green was the most satisfactory, the next in order being sodium arsenite. Borax appeared to be a slow poison, and yielded fair results.

Sodium Arsenite in Aqueous Solution was used, in one case, at a strength equivalent to 1 lb. in 5 gallons (2 per cent.). Corm was steeped in this solution for as long as 20 minutes, and the beetles exposed to the poisoned material for periods up to 48 hours, resulting in only 1 per cent. being killed after 24 hours and 40 per cent. dying within ten days of the inception of the tests.

Sodium Arsenite used as a Dry Powder diluted with three times its volume of flour killed 92 per cent. of the beetles, after their being exposed for 18 hours to the poisoned corm, which had been shaken for five minutes with the powder.

Barium Chloride, at a strength equivalent to 1 lb. in 2 gallons of water (10 per cent.), had no effect on the beetles, 100 per cent. being alive 16 days after the inception of the series, the periods for the steeping of the corm and exposure of beetles being the same as in the case of the sodium arsenite solution quoted above.

Paris Green, diluted with six times its volume of flour, killed 99 per cent. of the beetles after three hours' exposure to the poisoned corm, the latter being shaken for five minutes in the powder.

A considerable amount of work still remains to be done before any definite conclusions can be formed, so that these results cannot be considered as final, but are indicative of a portion of the work that has been carried out on this matter to date. They show, however, that large possibilities exist of materially aiding the present control measures employed in combating the pest by means of poisoned baits. Field tests will, of course, have to be made after the completion of those in the laboratory.

These tests have been seriously handicapped in their execution by the constant need of large supplies of beetles which were not always forthcoming.

The condition of the plants regarding virility has no influence on the female beetle in determining her selection of site for depositing eggs. In corms and stems lying on the ground, however, eggs have never been found in any part showing decay.

Cavendish, Lady's Finger, and Sugar banana plants are all attacked equally badly by the beetle borer. A few Gros Michiel plants have been seen, but they have invariably been growing in areas apparently free from beetle-borer infestation. This variety of banana plant is badly attacked in other parts, and therefore it cannot be considered, from the above statement, to be a beetle-borer resistant variety.

The distribution of the pest is very largely brought about by planting infested suckers or butts. Cases have been met with, however, in which the origin of infestation is most baffling.

It is often difficult to detect infested plants, particularly in plantations where the beetle borer is not numerous. Suckers may be removed from an infested area carrying eggs, be planted, strike, and even grow into fair plants, while one or two larvae are developing in them without showing noticeable signs of infestation. The beetles, once established in the plantation, will quickly make their presence felt unless measures to combat them are rigorously carried out.

NATURAL ENEMIES.

No trace has so far been found of the natural enemy (*Phasius javanus*) of the beetle borer imported in small numbers from Java and liberated last year. Time will be required for it to multiply before it will be readily detected. This parasite, introduced into Fiji by Jepson in 1914, was not recovered in the field until the middle of 1921. Since then information has been received that further adults of this species have been collected there.

An Elaterid ("skip-jack") larva, very similar to that collected by Mr. Tryon in the Cooroy district in 1916, and again by the writer in 1921, was found in a larval tunnel of the beetle borer in the Buderim district on 14th March, 1922. Only a single larva was found, and this unfortunately died before reaching maturity.

CONTROL.

The basis for any means of control of the banana beetle borer must rest on keeping the plantation as free as possible from breeding grounds and harbourage (*e.g.*, old corms, butts, and cut stems).

A badly infested stool is only a menace to the remainder of the plantation and should, therefore, be dug out and destroyed. In slightly infested stools old butts and infested material should be completely removed and either burnt or chopped up into small pieces, and the stems should be split in halves lengthways. By the opening up of corms and stems in this manner they will dry up or rot rapidly and cease to serve as either breeding grounds or harbourage. Wherever infested material is found, pieces of clean corm should be laid, cut surface downwards, flat on the ground, in or just outside stools or on the spot where infested cut stems, &c., are met with. These will act as baits for the beetles, and should be examined once per day; in the morning is best. The beetles will be found either on the under-surface of the bait or just underneath the soil under the bait. They can thus be collected and destroyed. No bait should be used for more than ten to fourteen days, as eggs will be laid in them and they will be thus liable to serve as breeding grounds: these pieces of corm should, therefore, be collected periodically and destroyed and fresh ones put out in their places. This procedure should be continued as long as beetles are caught under these baits. *These measures must be carried out thoroughly and continuously, however, to be effective.*

In order to guard against the spread of the pest into a new plantation, too much care cannot be exercised (1) in the selection of suckers to be used for planting, to ensure that they are free from any risk of being infested by the pest; and (2) in ascertaining that the site for the plantation is not adjacent to a beetle borer infested area.

Suckers may be dug in an infested plantation and be free from beetle borer when removed from the stool, but lying on the ground, often overnight, they act for the time being as baits. Beetles attracted to them deposit eggs which are extremely

difficult to detect, resulting in infested suckers being planted. Any which die off after planting should be dug out and closely examined for signs of beetle borer, evidenced by grubs or their tunnels, and possibly by beetles themselves.

Old butts, sometimes used for planting, are more readily examined than suckers for the presence of beetle borer, as the larval tunnels at least should be readily seen when the butt is opened up.

Plantations laid out adjacent to beetle-borer infested areas are very liable to become infested on account of the beetles migrating from the old into the new area, particularly as the food supply in the former become exhausted. Corm baits should be laid around the edge of the infested area and carefully examined periodically, and wherever practicable it is advisable for the growers' own benefit to dig out and destroy the infested stools whenever opportunity offers.

The presence of beetle borer in a mature plantation is most readily detected at any stage beyond that of the egg, by the presence of larval tunnels in old corms and stems; often the grubs and beetles will be found. Suckers showing an unhealthy appearance should be dug out and examined for signs of infestation.

Preliminary tests have just been started to ascertain if any method can be obtained which will be applicable to field conditions to free infested stools of the pest and prevent any reinfestation, and to prevent clean stools from becoming infested through the medium of treatment of the soil. These tests are in far too elementary a stage to warrant any comment on them at present.

In conclusion, I wish to express my indebtedness to Mr. Brännich and members of his staff for supplying and preparing chemicals for carrying out much of the work on the poisoning of corm baits.

CONCLUSIONS.

1. The rate of oviposition is greatly influenced by extremes in climatic conditions.
2. The development of eggs in the ovaries of the females is affected by the age of the beetles.
3. The rate of development of the different stages in the life cycle of the beetle is greatly affected by extremes of heat and cold.
4. The life of the beetle is very long.
5. Poisoning of corm baits, under certain conditions, as a means of killing the beetles has yielded promising laboratory results.
6. Co-operation of the growers with the scientific investigators is especially required.

TABLE A.

Lot. (See Table D.)			EGGS LAID FOR MONTHS OF—							From 25th May, 1921, to 15th December, 1921.	Total Eggs Laid to 31st July, 1922.
			1922. January, from 15th.	February.	March.	April.	May.	June.	July.		
A	..	..	7	7	0	..	..	..	..	242	256
B	..	..	0	3	6	23	0	..	..	237	269
C	..	..	2	5	11	3	0	..	..	680	701
D	..	..	25	45	27	20	..	..	..	260	377
E	..	..	2	0	0	3	0	0	0	50	55
F	..	..	3	9	17	21	5	6	1	445	507
G	..	..	45	52	117	176	57	68	16	1,153	2,084
H	..	..	24	36	58	119	36	36	21	1,323	1,653
I	..	..	0	31	52	26	5	6	3	436	559
J	..	..	16	21	16	29	1	3	3	608	697
K	..	..	10	13	43	24	0	0	0	345	435
L	..	..	5	14	9	..	..	..	..	18	46
M	..	..	10	21	29	11	5	0	0	..	76
N	..	..	1	2	4	0	..	..	..	..	7
O	..	..	3	4	8	0	0	0	..	..	15
P	..	..	9	7	18	19	..	..	..	..	53
Q	..	..	0	0	2	0	0	0	0	..	2
R	..	..	2	5	40	17	0	..	..	..	64

TABLE A—continued.

Lot. (See Table D.)		EGGS LAID FOR MONTHS OF—							From 25th May, 1921, to 15th December, 1921.	Total Eggs Laid to 31st July, 1922.
		1922. January. From 18th.	February.	March.	April.	May.	June.	July.		
T	..	..	..	0	83	8	8	2	..	191
U	..	..	..	..	13	2	1	0	..	16
V	..	..	..	..	..	47	26	14	..	87
W	..	..	..	..	..	1	2	0	..	3
X	..	..	..	..	..	..	..	2	..	2
Totals		164	275	547	587	167	156	62	6,198	8,156

TABLE B.

Eggs Laid.	Days to showing of first sign of Mandibles.	Days thence to emergence of first Larva.	Days for total Emergence.
18-27 Jan., 1922	5-6
27 Jan., 1922, to 28 Feb., 1922	6-8
28 Feb., 1922, to 27 Mar., 1922	..	6	7-8
5-28 April, 1922	..	7	9-11
19-29 May, 1922	..	22	29-30
9-14 June, 1922	..	25	30-34
Minimum— 25 Jan., 1922, to 1 Feb., 1922	4-5
Maximum— 9-14 June, 1922	25	30-34

TABLE C.

Collected or Bred.	Reference to Table D.	Dates of Collection or Breeding.	Dates of Last Death.	Life of Beetles in Days.	Life of Beetles in Lunar Months, &c.
Collected	A	24-28 Jan., 1921	10-13 Mar., 1922	406-413	14 months 2 weeks to 14 months 3 weeks
Collected	B	3-5 Feb., 1921	26-29 May, 1922	448-453	16 months to 16 months and 5 days
Collected	C	8-12 Feb., 1921	18-21 Apr., 1922	369-376	13 months and 5 days to 13 months 1 week and 5 days
Collected	D	21-25 Apr., 1921	22-26 May, 1922	392-400	14 months to 14 months 1 week and 1 day
Collected	F	29 Apr., 1921, to 5 May, 1921	25 Jul., 1922, to 1 Aug., 1922	446-459	15 months 3 weeks and 5 days to 16 months 1 week and 4 days
Bred	M	11-27 Oct., 1921	10-13 Mar., 1922	134-153	4 months 3 weeks and 1 day to 5 months 1 week and 6 days
Bred	N	15-24 Nov., 1921	17-25 Jul., 1922	235-252	8 months 1 week and 4 days to 9 months
Bred	O	25-28 Nov., 1921	26-28 Apr., 1922	124-129	4 months 1 week and 5 days to 4 months 2 weeks and 3 days
Bred	P	2-9 Dec., 1921	19-23 Jun., 1922	192-203	6 months 3 weeks and 3 days to 7 months and 1 week
Bred	Q	2-12 Dec., 1921	9-14 Jun., 1922	179-194	6 months 1 week and 4 days to 6 months 3 weeks and 5 days
Bred	R	1-12 Dec., 1921	26 Jun., 1922, to 12 Jul., 1922	196-223	7 months to 7 months 3 weeks and 6 days
Bred	S	16 Jan., 1922 ..	26-29 May, 1922	130-133	4 months 2 weeks and 4 days to 4 months and 3 weeks
Bred	..	13 Jun., 1921 ..	16-19 Jun., 1922	365-368	13 months and 1 day to 3 months and 4 days
Bred	..	16 Jan., 1922 ..	26 Jun., 1922, to 12 Jul., 1922	182-198	6 months and 2 weeks to 7 months and 2 days

SUGAR : FIELD REPORTS.

The Southern Field Assistant, Mr. J. C. Murray, reports under date 7th September, 1922, as follows:—

Maryborough.—The areas under cane in this district are gradually being extended, especially in the direction of Magnolia. Much good land still remains to be cleared in this locality. As soon as the farmers get a guarantee of future stability, settlement will extend in these areas. Cane varieties making good progress on a number of farms are Meerah, Striped Singapore, Black Innis, N.G. 16, D. 1135, and 1900. Meerah has been giving good returns with an average c.e.s. value of 13 per cent. The growers are reminded to observe their cane carefully with regard to resistance, susceptibility, and tolerance to disease, and always keep ahead of them the fact that careful selection of plants is the most efficient method of keeping the field clean.

A cane which should do well in this district is E.K. 1. This variety is a good sugar-content cane, with a high resistance to disease, and of exceptionally good standover properties. Queensland 813 should be planted also. Farmers should guard against the unnecessary destruction of timber, as vegetation has a marked influence on the rainfall.

Pialba.—Cutting was in full swing at Pialba. The growers are going to have a fairly successful harvest, judging by the cane that is coming off and that which is to be cut. Cane varieties looking well at present are Shahjahanpur No. 10, Q. 813, Q. 970, Q. 1098, Q. 855, and H.Q. 77. These varieties are in a small plot established by a local grower. New canes obtained from the Sugar Experiment Stations very often do not get a fair trial, frequently being planted on a partially sterile portion of the farm—that which will not grow the staple variety. Of the canes mentioned above, Q. 970, Q. 1098, and Q. 813 should do well in the Pialba district. The growers in this area are advised to pay much attention to the question of deep cultivation and the planting of green-mature crops. Good fertiliser results have been obtained by using 5 cwt. per acre of a mixture containing 7 per cent. of nitrogen and corresponding quantities of potash and phosphoric acid.

Mount Bauple.—Growers here are doing good. If the farmers keep up the current standards in the subsequent cultivation, they will do much towards checking setbacks by dry spells. Varieties doing well at Bauple are Q. 822, D. 1135, Q. 813, and M. 1900 Seedling. Several growers are busy extending areas at present planted. The farmers' outlook is hopeful.

Very fair crops may be seen at Antigua. The prospect of stability in the sugar industry is acting as a stimulus, and it is the intention of settlers to extend their areas. Varieties making a good showing include D. 1135, Striped Singapore, Black Innis, Rappoe, M. 1900 Seedling, Mahona, and Malagache. Growers are advised, however, to concentrate on planting Q. 813, D. 1135, and M. 1900 Seedling as much as practicable. Green manuring should be undertaken as much as possible, as the colour and texture of the soil indicates a deficiency of humus.

Between Mount Bauple and Nambour, with the exception of Yandina, very little cane is growing at present. There is a big colony of ex-service men in these districts who have farms and who are looking toward the sugar industry as a means of making a living.

Nambour.—Progress is being made in this district with canegrowing. More attention is being paid to the question of liming and draining, especially on Petrie Creek and the Maroochy River, and the effect of these measures is already evident. The crushing here this year is going to be a good one. Conditions in this respect are better than was to be expected, as the heavy rains of early in the year were followed by an intensely dry period. Any growers who are ploughing out their stools after this cutting are recommended to get down as deeply as possible with the plough, and if possible to lime. Varieties on the Maroochy River and Petrie Creek areas that are doing well include Q. 813, H.Q. 285 (early maturing), N.G. 16, and D. 1135.

The growers are advised to include in their experiments Q. 970 and Q. 1098; also E.K. 1. Points farmers should note in studying canes are whether they strike well, if they are erect in manner of growth, whether the trash is adhesive or not, the resistance to disease and drought, and their c.e.s. value. Another important point is the standover qualities of the cane.

In the Mapleton district good progress is also being made with canegrowing. Mr. Story, who already has a considerable acreage under good milling cane, is extending his existing plantation by a number of acres. Some of the best canegrowing on the Maroochy River watershed is to be seen on the slopes below Mapleton, and the growers are strongly advised to keep on and extend their areas, keeping, however, out of the low-lying portions. The principal cane growing is H.Q. 285.

At Yandina, on the Maroochy River, there is a considerable acreage of cane growing. The variety Q. 813 is making an exceptionally good showing, as also is H.Q. 285.

The Northern Field Assistant, Mr. E. H. Osborn, reports under date 5th September, 1922, as follows:—

Bowen.—A few days were spent in this district early in the month. The weather conditions were then very dry, the total rainfall for the year up to then only amounting to 23.61 inches, and of this amount 0.13 fell in April, 0.11 in May, and 0.50 in June. Luckily a fall of 2.40 inches in July helped to improve the outlook very considerably.

Going through the district some very good irrigated cane was noted, mostly the Gorus (N.G. 24, 24 A, and 24 B), Badila, Q. 855, and D. 1135. On Mr. Burrell's farm the four latter-mentioned canes (plant) were showing a very fine growth, whilst some first ratoons of Gorus and D. 1135 also looked very well.

Mr. Burrell has now 7½ acres under cane, and has just planted another 8½ acres and intends to grub and plant a further 20 acres for next year. On Mr. Payne's property some really good Badila was also seen, good stools with a heavy barrel. His density returns from samples sent to Proserpine Mill were:—

Gorus (ratoons), 16.8 c.e.s.

H.Q. 426 (plant), 16.5 c.e.s., November planting.

Badila (plant), 15.2 c.e.s., May planting.

Quite a number of the Bowen growers expressed their intention of increasing their areas. The Proserpine mill has erected a couple of fine derricks at the Don and Delta sidings for the convenience of farmers. Liming and manuring are receiving attention, as it is recognised that on small areas it will pay to get the best results possible.

Proserpine.—This area was also found to be suffering from the dry weather, as the rainfall for the seven months ending 31st July amounted only to 34.63 inches. Generally speaking, this year's crop will be a slight one, mainly on account of too much continuous wet weather last year and a shortage of rain in the growing period of this year, the result being that the autumn plant cane has not made the growth that it should have, and the ratoons are also very backward. The outstanding feature is certainly the very large area that is being planted for next year. In every part of the area this activity was most noticeable. With all the unused land in the Proserpine area, the local mill should be crushing a great deal more cane. The Torvale Estate has now some 70 acres, and Messrs. Phaff Bros. are just completing 50 acres.

The principal canes grown in this district so far are the Gorus (N.G. 24, 24 A, 24 B), Clark's Seedling (H.Q. 426), Malagache, Badila, with smaller quantities of D. 1135, Striped Singapore, M. 1900, and the newer varieties such as E.K. 1, Q. 813, Q. 855, Q. 903, Q. 1121, and Q. 116. Of these, H.Q. 426 is still a great favourite here and the cane now being crushed certainly justifies its popularity. Q. 813 also gave very fine average results in density last season, being second only to H.Q. 426. The latter's average was 14.5 c.e.s., whilst Q. 813 was 14.25 c.e.s.

A large proportion of the cane planted out this year will certainly be Q. 813.

Pests.—Proserpine district is, so far, fairly free from pests. A few borers were noticed in isolated places, and grubs have caused damage to a limited extent on Kelsey Creek, Cannon Valley, and Strathdiekie. On the latter place Messrs. Redhead Bros. are still using dressings of arsenic on their plant cane.

Practically no grubs were in the areas so treated last year, but in one place this season the resultant first ratoons, which were volunteered and had no further dressing of poison, show a few grubs in one corner.

Far more liming and fertilising is now being carried on than formerly in the district, and the growers seem quite alive to the importance of this practice. Cane was coming in to the mill from Cannon Valley—mostly mountain-side grown.

Mr. J. Smith was cutting a fine crop of Badila that will probably return him a 40-ton crop per acre, and its density is 16 c.e.s. This crop was grown upon a rough and rocky hillside, and it says much for the owner's energy in planting and harvesting cane under such arduous conditions.

Another grower who is also growing upon a very rough hillside is Mr. Altmann. He was cutting a heavy crop of Striped Singapore, which, though cropping very well, was not too high in density.

Another farmer who is growing upon very rough ground and also has a very long and rough haul to the tramway is Mr. W. Hallam. If the advocates of cheap sugar had to grow cane under such hard conditions, their ideas might possibly alter.

Most of this hillside land is a dark volcanic chocolate and heavily studded with rocks.

On some of the lower-lying ground Q. 813 is doing very well, one gentleman getting 16 c.e.s. off some 10-months-old plant cane. Again referring to the quality of the cane now being crushed, the general average is about 15 c.e.s. H.Q. 426 is again giving some fine returns, one grower's average to date being 16.9 c.e.s. for plant cane. Q. 813 is running a good second, as one farmer's average for this cane is 16.1 c.e.s. M. 1900 also is very good, and only a shade behind Q. 813 in quality.

Whilst visiting the district some very cold weather was experienced, and this and the very dry spell were not conducive to the young plant-cane making headway. With a fall of a few inches and some warm weather, the prospects for 1923 would be very much improved.

NEW SUGAR DISTRICTS.

BAMBAROO AND YURUGA.

The Director of the Bureau of Sugar Experiment Stations has received the following report dated 8th September, 1922, on new sugar-cane districts between Ingham and Townsville, from the Northern Field Assistant, Mr. E. H. Osborn:—

Bambaroo and Yuruga.—At the time of my visit, the conditions were found to be exceedingly dry. The total rainfall for the year had been only 34.59 inches. In the same period Ingham had 60.36 inches, and, naturally, under such dry conditions the growth of the cane was very backward.

Unfortunately, rainfall figures have not been kept for any length of time, and I was only able to obtain those relating to 1920 and 1921. These were 99.27 inches and 57.36 inches respectively, or an average of 78.31 inches for the period. Although the cane had made poor growth the density returns were very good, as the following figures show:—

A parcel of mixed Badila and H.Q. 426 (Clark's Seedling) from Mr. Hecht's farm went 17.45 c.e.s., and a nine-months-old plant crop of H.Q. 426 from Mr. D. Ross's place gave 15.90 c.e.s.

On Mr. Layton's place some H.Q. 426 ratoons with a few rows of Badila ratoons gave him an average of 16 c.e.s., and a tonnage of about 18 tons per acre. As a plant crop, he cut at the rate of 30 tons per acre, with an average density of 16 c.e.s. On Mr. Toale's farm a very heavy crop of Badila, going probably about 55 tons per acre, was being cut. This was growing upon a rich patch of dark scrub loam. The cane had been planted 15 months previously.

Some twenty-six farmers, with an acreage of about 208 acres, are supplying the Haughton Valley Mill from the siding between Rollingstone and Toobanna, and with good planting weather this number should be increased to about forty next year. Early in the season a tonnage of over 3,000 tons was expected in this locality, but the bad weather conditions have made these figures subject to a big reduction.

The areas visited were those adjacent to Bambaroo and Yuruga, or, roughly speaking, comprising the land on Waterfall and Waterview Creeks. These two creeks run from west to east across the railway line, which about here runs from south to north, and most of the cane land is upon the western side of the line and follows the course of these two creeks. The greater part of the land seen was either a fairly shallow, sandy, forest loam with about an average depth of 9 inches, or a darker and deeper forest loam that would probably average a couple of feet. The hills from which the creeks rise are mostly of granite formation. The country generally is very heavily timbered with Moreton Bay, blue and poplar gum, and a lot of bloodwood, whilst patches of acacia are found upon the heavier and deeper soils. Nearly all the farms visited consisted of very small patches of cane, the largest being Mr. Holland's, on Waterview Creek. He now has about 17 acres under cane, and hopes to plant another 20 in the near future. His area contains some very good land and is capable of considerable crop extension.

The light and shallow forest soils are capable of growing fair crops of high density cane, subject to good cultivation methods, but will require manuring fairly soon. The darker and deeper class of ground is capable of giving good cane returns for a considerable period, but will also benefit by being manured.

Although canegrowing is a new departure here, the residents are putting a good deal of energy into it. A small sawmill has also been installed at Bambaroo, and is engaged in cutting up tramway material for the Haughton Valley Mill.

PAPER MULCHING OF PINEAPPLES.

By A. T. LONGLEY, Board of Agriculture, Honolulu.

In consequence of the interest evinced by a large number of pineapple-growers in the Hawaiian method of growing pines under paper, which was noted in a recent "Journal," further information was sought. An opportunity of obtaining fuller knowledge presented itself when representatives of the Hawaiian Pineapple Company (Messrs. Barnes and W. H. McInerny) visited Brisbane in June last. Through the courtesy of these gentlemen we are now able to publish the full text of the article from an abstract of which our reference was taken.

A few years ago Mr. C. F. Eckart introduced a paper mulch for use in the production of sugar-cane, which is being used with great success in Hawaii. Mr. Eckart's patent rights covering paper mulch also include its use in the production of pineapples and various other crops. No experiments had been made with pineapples, however, until 1919, when an experiment was planted in roofing paper by the Hawaiian Pineapple Company, Ltd., after Mr. Whitmore had seen the mulch in use on cane in Olan. As a result of the excellent showing made by paper mulch in this and more recent experiments on both upper and lower lands, the Hawaiian Pineapple Company has acquired an option on all patent rights for growing pineapples in paper mulch. It is estimated that there are at present 461 acres planted in paper, 68 acres of which will fruit in 1922. The Hawaiian Pineapple Company has 431 acres, Libby, McNeill, and Libby, 25 acres, and the California Packing Corporation 5 acres.

The first yields were obtained from paper-mulch plantings during the past season. These yields and the appearance of all paper-covered plantings, ranging from a few months to two years old, leave little doubt as to the value of the paper. Plants in paper grow uniformly larger, greener, and healthier, and produce larger fruit than plants grown without paper. The fruit maturing on paper mulch last season was very carefully weighed, as was that on adjoining check lines, and the results showed an average weight of 4 lb. 8.24 oz. for the fruit grown with paper, while that grown without paper averaged only 3 lb. 8.66 oz.; a difference of nearly 1 lb. Allowing 7,300 fruiting plants to the acre, this shows an increase of 7,107.2 lb., or a little over 3½ tons in favour of the paper.

As the plants on paper were in much better condition after the fruit was harvested than those grown without paper, it is believed that the first ratoon crop will show at least as great an increase as the plant crop, and that the second ratoon crop will also show a substantial gain. It is not improbable that the total increase will amount to 8 or 9 tons for the three crops, and that an additional ratoon may be grown at a good profit in many fields. Had the entire field in which the experiment was conducted been planted with paper mulch and yielded at the same rate as the experiment, the production would have been 23.3 per cent. greater. From the appearance of plants in paper mulch on the better lands which will bear next year, there is reason to believe that this high percentage of increase will be maintained or even bettered. The experiments being conducted by the California Packing Corporation (Libby, McNeill, and Libby) and the Hawaiian Pineapple Company cover a wide range of soil and climatic conditions, and in every case show a decided improvement from the use of paper. In all experiments where the plants have been growing a few months, the exact boundaries of the paper-covered lines can be established from a great distance by the increased growth and healthier colour of the plants.

While the greatly increased yield is the most important benefit derived from the use of paper mulch, it has many good points that recommend it. While no account has been kept of weeding costs, it is conservatively estimated that paper mulch will save two-thirds of this expense. The space around the plants which ordinarily takes the most time needs no hoeing, and the weeds between the lines can be fairly well controlled by cultivating. In addition to cutting labour costs to a minimum, it prevents the growth of weeds between the plants during long wet spells. Fertilising costs are also lowered, as it is not necessary to feed the weeds. It is expected that the saving in weeding costs for two years will pay for the greater part of the material and labour for applying the paper.

Paper mulch also prevents hard rains from packing the soil around the roots of young plants, and in dry weather keeps the plant-food more available by holding the moisture in the soil, where under ordinary conditions it would dry out and bake. Tests made during the hot, dry weather showed approximately double the amount of moisture in soil under paper as in soil without paper. At the same time,

temperature tests were made with and without paper mulch, which showed the soil under paper to be warmer by from 2 to 5 degrees, depending on the quality of the paper, and also showed a minimum ranging from 2 to 6 degrees higher at night. The temperatures were taken under several different makes of paper with recording thermometers such as are used in the canneries.

After successful experiments had been carried on by the Hawaiian Pineapple Company and others at Wahiawa, the Hawaiian Pineapple Association's experiment station planted an experiment in April of this year (1921) at Kailua, Oahu, which shows conclusively that paper mulch is far better for that section than any of the other fifty plots which were treated with various chemicals. The plant growth on the paper mulch is at least three times greater in weight and much healthier than other plots, only two plants out of 129 showing the least signs of weakness. Practically all plants in the chemically treated and check plots are small, weak, and of poor colour. There has been practically no rain at the experiment since it was planted, yet the soil under the paper has been kept in a moist and friable condition throughout, even when no signs of moisture could be found to a depth of 18 inches in other plots. Especially interesting is the fact that a plot of approximately 10 by 15 feet entirely covered with roofing paper shows even better plants than the adjoining plot, where only the lines were covered. The soil under the middle of this plot was apparently as moist and loamy as under the other. It is evident that it would be impracticable to put paper over a whole field, even though it were not necessary to cultivate. Space must be left for drainage and for the men in harvesting. If it is true that the control of moisture and temperature are factors in checking what is known as wilt, paper mulch may be the remedy.*

The best and cheapest method of applying the paper, so far as known, is by hand. After the land has been properly prepared for planting, a sled is dragged along the slightly raised line, breaking lumps, smoothing the surface, and bevelling the sides slightly. The paper, which comes in rolls of about 500 square feet each, is fastened at the end of the line by putting some soil on it. A man, with an adjustable handle which fits in both ends of the roll, backs along the line, unrolling the paper. As the paper is unrolled a man on either side of the paper puts on enough soil with a hoe to keep the wind from tearing it until a small plow can throw a small amount of soil along both edges. Care should be taken, however, not to get too much soil on the paper, and it is sometimes desirable to have a man follow the plough with a broom to sweep off any excess. There should be a gentle slope from the centre of the line towards the edges of the paper in order that the water may run off quickly instead of standing in depressions between the plants. A crew of four experienced men can lay paper for \$3.00 an acre or less. This figure will be reduced somewhat when the paper is cut in 300-foot lengths to fit the standard lines, instead of the 110 to 170-foot lengths, as at present, which necessitate an extra man in the laying crew to carry the rolls of paper from the field road towards the centre of the line.

An ideal paper mulch for pineapples should have the following qualities:—It should be 300 feet long, at least 36 inches wide for double lines, strong enough to withstand the weather for at least two years without shrinking or tearing, or rotting out on the edges where it is necessary to put the soil to hold it in place. It should also be waterproof and of good insulating qualities to hold the heat and moisture around the roots. In order to determine the relative values of different makes and qualities of paper for use in the production of pineapples, a comparative experiment was planted by the Hawaiian Pineapple Company on 3rd September, 1921, containing ten kinds of building, insulating, and specially made papers. The papers being tested are all 36 inches wide, but vary in length from 110 to 300 feet to the roll, in weight from 5 to 14 lb. per 100 square feet, and range in cost from \$40.00 to \$244.00 per acre. A close check is being kept on these different papers to see how they stand the weather, and careful records will be kept of the yields. At this early date it would appear that one of the cheaper papers will be the best adapted for pineapple culture.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS FOR AUGUST, 1922.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Miss Fearless ...	Ayrshire ...	30 May, 1922	660	4.5	35.10	
Hedges Nattie ...	Friesian ...	20 May, "	690	3.8	30.90	
Dawn of Warragaburra	Jersey ...	17 May, "	480	5.2	29.40	
Songstress ...	Ayrshire ...	4 July, "	750	3.3	28.80	
Confidence ...	" ...	13 Aug., "	551	4.0	25.65	
Netherton Belle ...	" ...	19 July, "	510	4.1	24.60	
Dear Lassie ...	" ...	19 June, "	600	3.5	24.30	
College Cold Iron	Jersey ...	25 Jan., "	390	5.3	24.30	
Gay Lassie ...	Ayrshire ...	20 Feb., "	420	4.8	23.70	
Prim ...	Friesian ...	6 Feb., "	660	3.1	23.70	
Little Buttercup...	" ...	12 Dec., 1921	600	3.4	23.70	
La Hurette Hope	Jersey ...	30 June, 1922	450	4.4	23.10	
Snowflake ...	Shorthorn...	20 Feb., "	516	3.8	22.80	
Lute ...	Ayrshire ...	8 Jan., "	480	4.0	22.20	
Magnet's Leda ...	Jersey ...	8 Feb., "	450	4.2	22.20	
Miss Betty ...	" ...	17 May, "	420	4.4	21.60	
Sheila of Nundorah	Guernsey ...	6 April, "	360	5.0	21.00	
College Cobalt ...	Jersey ...	3 April, "	390	4.6	21.00	
College La Cigale	" ...	10 July, "	420	4.3	21.00	
College St. Margaret	" ...	16 June, "	360	4.8	20.10	
Lady Annette ...	Ayrshire ...	2 Jan., "	360	4.8	20.10	

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, AUGUST, 1922.

The month of August has been favourable for egg production. In the light breed section, Mr. N. A. Singer's six pullets laid the highest monthly total of 169, his "B" bird completing a total of 48 eggs before breaking off. Mr. C. H. Singer is next with a total of 156. In the heavy section Mr. R. Burns comes first with a total of 152 for the month, followed by Mr. Hindley with 145. The weighing of eggs is not quite completed, but it is pleasing to note the fine average size of eggs laid by the competitors. From present appearances it is thought that very few pens will fail to secure the full weight. One bird died during the month, the cause of death being bowel trouble. The following are the individual records:—

Competitors.	Breed.	August.	Total.

LIGHT BREEDS.

*N. A. Singer	...	...	...	White Leghorns	...	169	580
C. H. Singer	...	...	...	Do.	...	156	548
*W. and G. W. Hindes	...	...	...	Do.	...	130	546
*Bathurst Poultry Farm	...	...	...	Do.	...	116	488
*W. A. Wilson	...	...	...	Do.	...	131	459
*T. Fanning	...	...	...	Do.	...	123	455
J. H. Jones	...	...	...	Do.	...	125	453
*G. Trapp	...	...	...	Do.	...	121	453

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	August.	Total.
LIGHT BREEDS— <i>continued.</i>			
*Mrs. L. Andersen ...	White Leghorns ...	126	445
*S. L. Grenier ...	Do. ...	133	413
A. C. G. Wenck ...	Do. ...	123	410
*R. Gill ...	Do. ...	137	428
*W. Becker ...	Do. ...	124	427
*J. M. Manson ...	Do. ...	131	423
*H. P. Clarke ...	Do. ...	131	422
B. Hawkins ...	Do. ...	126	417
*G. Williams ...	Do. ...	118	415
*O. Goos ...	Do. ...	122	415
J. Purnell ...	Do. ...	125	410
*J. W. Newton ...	Do. ...	134	402
A. Maslin ...	Do. ...	123	402
*R. C. Cole ...	Do. ...	123	395
*Harold Fraser ...	Do. ...	114	385
*C. Goos ...	Do. ...	128	383
*Oakleigh Poultry Farm ...	Do. ...	127	369
*Mrs. E. White ...	Do. ...	98	369
*Mrs. R. E. Hodge ...	Do. ...	132	361
T. H. Craig ...	Do. ...	115	357
*J. W. Short ...	Do. ...	122	356
*M. F. Newberry ...	Do. ...	115	351
*Thos. Taylor ...	Do. ...	127	349
G. F. Richardson ...	Do. ...	103	343
*C. M. Pickering ...	Do. ...	107	310
*R. C. J. Turner ...	Do. ...	126	339
W. J. Nairn ...	Do. ...	116	338
*F. Birchall ...	Do. ...	107	333
E. Stephenson ...	Do. ...	101	331
*E. A. Smith ...	Do. ...	110	321
B. C. Bartlem ...	Do. ...	100	320
E. Symons ...	Do. ...	114	317
A. Anders ...	Do. ...	104	282
Brampton Poultry Farm ...	Do. ...	113	271
H. Trappett ...	Do. ...	109	241
Parisian Poultry Farm ...	Brown Leghorns ...	86	110

HEAVY BREEDS.

*A. E. Walters ...	Black Orpingtons ...	127	513
*R. Burns ...	Do. ...	152	493
*R. Holmes ...	Do. ...	129	481
*H. M. Chaille ...	Do. ...	134	473
*T. Hindley ...	Do. ...	145	473
Jas. Hutton ...	Do. ...	125	455
Mrs. A. Kent ...	Do. ...	126	453
Wambo Poultry Farm ...	Do. ...	114	429
*C. C. Dennis ...	Do. ...	139	404
*E. F. Dennis ...	Do. ...	118	397
*Jas. Potter ...	Do. ...	127	385
Mrs. A. E. Gallagher ...	Do. ...	127	385
*Rev. A. McAllister ...	Do. ...	98	377
R. Innes ...	Do. ...	136	367
Mrs. L. Maund ...	Do. ...	116	356
V. J. Rye ...	Do. ...	135	317
C. Doan ...	Do. ...	128	336
Jas. Hitchcock ...	Do. ...	129	328
H. B. Stephens ...	Do. ...	127	313
*Parisian Poultry Farm ...	Do. ...	136	302

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	August.	Total.
HEAVY BREEDS— <i>continued.</i>			
W. Becker ...	Chinese Langshans ...	124	302
C. Rosenthal ...	Black Orpingtons ...	104	285
W. C. Trapp ...	Do. ...	116	267
R. Burns ...	Silver-laced Wyandottes ...	136	219
*J. E. Smith ...	Plymouth Rocks ...	109	193
*Miss L. Hart ...	Rhode Island Reds ...	69	75
Total ...	...	8,547	26,443

* Indicates that the pen is being single tested.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
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LIGHT BREEDS.

N. A. Singer ..	83	112	89	99	97	100	580
W. and G. W. Hinde ..	101	85	94	88	99	79	546
Bathurst Poultry Farm ..	66	66	86	94	101	75	488
W. A. Wilson ..	74	69	61	91	76	88	459
T. Fanning ..	53	98	84	88	101	31	455
Geo. Trapp ..	87	62	67	86	74	77	453
Mrs. L. Andersen ..	92	53	80	75	68	77	445
S. L. Grenier ..	72	45	80	80	81	85	443
R. Gill ..	81	78	87	66	52	64	428
W. Becker ..	67	44	84	69	75	88	427
J. M. Manson ..	71	57	82	57	82	74	423
H. P. Clarke ..	75	55	73	80	73	66	422
G. Williams ..	64	73	79	70	67	62	415
O. Goos ..	69	51	80	89	75	51	415
J. W. Newton ..	87	67	79	49	74	46	402
R. C. Cole ..	76	76	77	37	65	64	395
H. Fraser ..	68	77	62	57	53	68	385
C. Goos ..	48	52	48	75	89	71	383
Oakleigh Poultry Farm ..	74	51	68	54	51	71	369
Mrs. E. White ..	82	11	70	45	83	78	369
Mrs. R. Hodge ..	85	34	54	60	75	52	364
J. W. Short ..	60	61	73	49	42	68	356
M. F. Newberry ..	62	34	48	89	46	72	351
Thos. Taylor ..	77	45	63	60	60	44	349
C. M. Pickering ..	77	72	40	54	58	39	340
R. C. J. Turner ..	60	46	71	66	62	34	339
F. Birchall ..	56	64	32	39	73	69	333
E. A. Smith ..	70	43	72	63	34	30	321

HEAVY BREEDS.

A. E. Walters ..	84	81	75	82	97	94	513
R. Burns ..	74	87	68	92	87	85	493
R. Holmes ..	61	100	81	81	74	84	481
H. M. Chaille ..	99	70	88	82	82	52	473
T. Hindley ..	58	82	49	116	113	55	473
C. C. Dennis ..	66	79	71	60	71	57	404
E. F. Dennis ..	73	65	85	17	73	84	397
J. Potter ..	59	70	76	64	78	38	385
Rev. A. McAllister ..	73	81	94	39	11	79	377
Parisian Poultry Farm ..	35	57	60	31	60	59	302
J. E. Smith ..	15	41	30	26	40	41	193
Miss L. Hart ..	12	18	9	21	0	15	75

CUTHBERT POTTS, Principal.

THE PHYSIOGRAPHY OF NORTH AUSTRALIA—II.

By DR. H. I. JENSEN, Geological Survey, Brisbane.

The first instalment of these notes, descriptive of the physiography of the Northern Territory, was published in the September Journal.

NORTH QUEENSLAND.

North Queensland is a peneplain elevated in the post-Cretaceous periods. The maximum elevation has been along the east coast. Elevation has been alternating with subsidence in the Gulf country, but the present tendency is for the land to gain on the sea principally through alluviation. Actual elevation is but slight, as shown by the Gulf rivers within Queensland, which are not cutting down their channels, but run for hundreds of miles before entering the sea as shallow, wide watercourses filled with sand.

North Queensland has been a continental area, or an area affected only by isostatic earth movements since the Carboniferous.

Mesas of Permo-Carboniferous sandstone lying almost horizontal survive at Mount Mulligan, between the Walsh and Mitchell Rivers and in the peninsular west of Cooktown. These are often almost conformably overlain by Jurassic rocks, and extensive flat-tops of Jurassic Sandstone are also scattered through North Queensland. These were formerly known as Desert Sandstone, but that term is now practically obsolete as a geological horizon.

Laterites occur extensively in North Queensland as disjointed cappings on tablelands, but are disintegrating, which is evidence of the climate getting wetter.

Great areas of North Queensland have been faulted down along the Pacific Coast in Tertiary times, and are now under the Barrier Reef.

The North of Queensland is from the physiographic standpoint divisible into three divisions:—

- (a) The Pacific Slopes, with high rainfall, rich soils, and rough topography;
- (b) The Mountainous Mining Belt, with poor soil, medium rainfall, rough barren topography, and very rapid drainage;
- (c) The Gulf Country, which is roughly divisible into the same zones as the Northern Territory and has the same characters.

To (a) Division belong the Cairns, Atherton, Herberton, and Cooktown districts. The Hodgkinson, Irvinebank, Featherbed, and Chillagoe belts belong to (b) division, and the Einasleigh and Croydon districts belong to (c) division.

I append notes which I have made on the physiography of each of these districts.

The Pacific Slopes of North and Central Queensland are a subsiding area, but south of Great Sandy Island the coast is rising, especially around Moreton Bay.

The drying-up of swamps from natural causes has been noticed in active progress. Several areas of melaleuca swamp in the East Moreton (South Queensland), have in the last twenty years become dry Casuarina country.

REVIEW OF INDIVIDUAL DISTRICTS.

The CAIRNS COASTAL BELT.

Taking this to mean the strip of country lying between the Barron River on the north, and the Herbert River on the south, the sea on the east, and the Atherton-Herberton tablelands on the west, the following is a brief resumé of its characteristic features:—

Physiography.—The belt is rugged in the extreme. High mountains rise abruptly from the very seashore or from a narrow alluvial coastal plain. Here and there disconnected outliers of the coastal range stand forth as conical peaks. Mt. Bellenden-Ker, one of the peaks on the range itself, is the highest mountain in Queensland, although it is only a few miles from the coast.

Soils.—At the foot of the coastal range, rock waste from the denudation of these high mountains is accumulated to a great depth. Being derived from a variety of formations ranging from acid igneous rocks, like granite and rhyolite, and silicious slates, to basic igneous and metamorphic rocks, like basalt and amphibolite, the soils of the coastal plain are loamy and rich in plant food, yielding the excellent sugar lands for which the district is justly famed.

Rainfall.—The rainfall of the district is very high. Thus Geraldton, on the Johnstone River, over a period of twenty-two years has had an average annual rainfall of 145.71 inches, most of which falls in the months from December to March inclusive (Commonwealth Meteorological Bulletin No. 4.). The average annual rainfall of Cairns was given as 91.3 inches. During the dry-season months this belt receives light rains, known as "scrub rains," which are very beneficial to agriculture. There is a danger that if all the mountain scrubs be cleared these scrub rains will cease, and the fertility of the district would thus be greatly diminished.

Forests and Timbers.—As a result of rich soil and a damp climate, dense scrubs covered all the best of the country in its virgin state. In these scrubs flourished numerous species of pine, maple, cedar, mahogany, and other valuable timbers, which are being rapidly cut out without any thought of the future. On the less fertile soils the dominant forest flora consists of the usual tropical eucalypts, melaleucas (tea-trees) and acacias (wattles). Along the sea frontages and estuaries there are great mangrove jungles of future prospective value for the high tannin in the mangrove bark, and the considerable potash percentage in the ashes of the wood of the mangrove.

Sugar, cotton, coffee, rice, and most other tropical productions do well in the district. Citrus fruits and all tropical fruits grow luxuriantly on the talus soils at the foot of the hills. Apples, pears, and cherries will grow on the Herberton Tableland.

THE KANGAROO HILLS DISTRICT.

Physiography.—This district consists of rugged mountains and ravines. The ranges and tablelands, which often exceed 2,000 feet in altitude, are built up of granitic and metamorphic rocks, here and there broken through by and capped with basalt of late Tertiary age, as at Mt. Fox, a quite recent basalt cone.

Soils.—The basaltic soils are good, but by far the largest area of the district has only very poor silicious soils.

Rainfall.—On the coastal plain at Halifax and Ingham the rainfall is heavy, but on the Kangaroo Hills it is comparatively low, averaging about 25 inches per annum, practically the whole of which falls in the wet-season months. For this reason even the basaltic soils constitute mainly forest country, scrubs being confined to the eastern slopes and a few moist gullies.

Timbers.—Spotted gum (*E. maculata*) woolly butt (*E. miniata*), ironbark (*E. melanophloia*), and bloodwood (*E. terminalis*) are the principal forest timbers on the hills. On the granite areas the dominant timbers were *Eucalyptus grandifolia*, *E. alba*, and in moist places *E. papuana*; on the metamorphics, ironbark (*E. crebra*) predominates, on the basalt around Mt. Fox, bloodwood (*E. corymbosa*, *E. terminalis*), box (*E. microtheca*) and blue gum abound, while on the desert sandstone we have abundant yellow-jacket (*E. trachyphloia*), ironbark, setose gum (*E. setosa*), wattle, and stunted bloodwood.

COOKTOWN DISTRICT AND BACK COUNTRY.

Physiography.—Owing to the heterogeneous geological formations of this area, there are great variations of soil and climate. The immediate vicinity of Cooktown consists of high hills of granite and slate formation rising out of a narrow coastal plain consisting of the same rocks. Extensive alluviated flats cover the interspaces between the hills, and where these are periodically flooded by salt water from the Endeavour River, mangrove jungles constitute a physiographic feature.

Not more than 20 miles inland, following the railway line, we enter a low tableland from 300 to 600 feet high, built up of sandstones. Westwards this tableland extends nearly to Maytown, gaining an altitude of over 1,400 feet.

Rainfall.—The rainfall at Cooktown averages nearly 65 inches per annum, mostly wet-season rains, but on the sandstone tableland the average is probably only 40 inches.

Soils.—The soils of the district, being derived from acidic rocks, mainly are very poor. Some of the alluvial flats near Cooktown are fair, but the granite and slate soils are very mediocre. The sandstone soils further west are exceedingly bad, and neither suitable for cultivation or for pastoral pursuits.

Vegetation.—The granite slate soils near Cooktown have the usual tropical eucalypt flora (*E. papuana*, *E. grandifolia*, *E. terminalis* (bloodwood); *E. alba*, *E. tetradonta*, *E. crebra* (ironbark); and ironwood (*Erythrophloeum*). The sandstone soils have only stunted gums, tea-tree (melaleuca and leptospermum species), hakeas, grevilleas, and a few acacia species. Bastard bloodwood (*E. latifolia* ? or *E. dichromophloia*) and ironbark (*E. crebra*) occur on a few conglomerate areas. Commercial

sandalwood occurs widely spread throughout the district on alluvial flats. It is one of the main products of the district to-day. The timbers observed to be most abundant on the Little Laura sandstones were stringybark (*E. tetradonta*), bloodwood (*E. terminalis* or *E. Abercrombiana*), bastard bloodwood (*E. latifolia* ?), ironwood, gum (*E. grandifolia*, also called erroneously Moreton Bay Ash), hakeas, wattles, grevilleas, capoe tree, and gardenia, with pandanus and tea-tree on the river banks.

ATHERTON-HERBERTON TABLELANDS.

Physiography.—We may regard as one physiographic unit all that strip of hinterland which is in part scrub-covered on the basaltic and slate areas. This type of country extends from Mt. Molloy, through Atherton, to Ravenshoe. The southern portion of the area is further divisible into the Barron upland plain and the Herberton tablelands. The Barron Valley has an elevation of 1,325 feet at Mareeba, and 2,466 feet at Atherton. The Herberton-Ravenshoe tableland is a step higher, averaging 2,900 to 3,000 feet. The area is rough in places, as on the eastern slopes of the Herberton plateau and in the Tinaroo Hills, but there are considerable areas of plain country representing late Tertiary basalt flows.

Rainfall.—The distribution of the rainfall is somewhat uneven, owing to the varied topography of the district. Those subdivisions of the tablelands, which are very rough and mountainous, get a higher rainfall than the more level areas, and the scrubs get scrub rains which often do not extend beyond the edge of the scrubs. The average annual rainfall is somewhere about 50 inches for the whole district. At Mareeba it is somewhat lower because the Dimbula granite area extends eastwards almost to the Barron Falls, and weathers evenly, yielding gently undulating country with poor soil. This area, therefore, approaches the Featherbed area in climate.

Soils.—The soils on the basalts are deep and rich, forming the excellent dairying lands of the Atherton and Ravenshoe districts. The granites have poor soils. Most of the metamorphic rocks yield poor soils also, but some, chiefly the amphibolite schists, yield very good soils. The basalt soils were scrub covered in the virgin state, except around Mareeba, where the inland type of climate prevails. The Barron plain is a broad valley infilled with basalt, which yields rich scrub soils. A large portion of the Herbert Valley is similarly basalt flooded, yielding a rich agricultural area.

The sudden steep fall of the coastal range to the east, and the occurrence of what seem to be Devonian rocks on the coastal plain, point to the presence of a big fault immediately east of the Tinaroo Hills.

Timbers.—The scrubs contain a varied flora, largely softwoods, including pine, cedar, maple, beech, and other valuable timbers. The forest country exhibits the usual relationship between geological formation and forest flora.

On the granites, box (*E. microtheca*), poplar gum (*E. alba*), and on moist flats river gum (*E. Tereticornis*) dominate; on diorite, bloodwood and ironbark; on the greissen, bloodwood (*E. terminalis* ?); and on the metamorphic rocks, ironbarks (*E. crebra* or *E. leptophleba*) and gum (lemon scented, *E. citriodora* ?). In the Herberton district stringybark is also fairly plentiful on poor soils, both of granite and metamorphic origin.

IRVINEBANK-EMUFORD AREA.

Physiography.—This rich mineral district is situated west of the Herberton district, and extends west as far as the Mount Garnet railway north to the Chillagoe railway. Irvinebank is in the centre. The area consists mainly of rocks of the Herbertonian series (Ordovician?).

The district is very rugged and mountainous, and in most places exceeds 2,500 feet in elevation.

The rocks most frequently met with are greywackes and chlorite schists, with some slates, quartzites, and phyllites, all intruded extensively by porphyries of the Featherbed type and by later granites with their dyke retinue.

Rainfall.—The rainfall at Irvinebank averages about 43 inches per annum. Most of it falls in the wet-season months.

Soils.—The soils of the district are mostly poor.

Vegetation.—Since the soils are poor and the rainfall is confined mainly to the wet season, there are no scrubs in this district.

On the arkose-like greywackes of the district, as near Mount Albion, we have a yellow-jacket (*E. Trachyphloia* ?); on lode formations a gum-topped bloodwood known as "Dead Finish" is common (*E. Cloeziana* ?). On the granite country between Irvinebank and Stannary Hills we have broad-leaved ironbark (*E. melanophloia*), scented gum (*E. citriodora* ?), and pine. On the Featherbed porphyry rocks the narrow-leaved ironbark is the commonest tree, but on associated tuffs and more basic porphyries we also get lemon-scented gum, broad-leaved ironbark box (*E. leptophleba*), and pine. On the slates and schists, the scented gum, white gum (*E. pallidifolia* ?), narrow-leaved ironbark (*E. crebra*), and bloodwood are common. Poplar gum (*E. alba*) is also a common form on the porphyry country.

FEATHERBED RANGE.

Physiography.—This district is very mountainous and rugged. The rocks are of the same types as those of the Irvinebank area, but the porphyries predominate to such an extent that the district is very much more barren than its neighbour to the south. The elevation ranges from 1,500 to 2,500 feet.

Rainfall.—The average rainfall is about 36 inches per annum, practically all wet-season rains.

Vegetation.—On the porphyries between Boon-Moo and Petford, narrow-leaf ironbark is characteristic on the slopes and poplar gum (*E. alba*) on the flats. Where the porphyries are syenitic, bloodwood also comes in. Scented gum occurs in scattered places on tuffs and metamorphics where the depth of soil is sufficient.

On the acid granites near Lappa, silver-leaved ironbark (*E. melanophloia* ?), bloodwood (*E. latifolia* ?), pine (*callitris*), capoe (*bombax*), hakea (beefwood), quinine (*petalostigma quadriloculare*), grevillea, gum or ash (*E. grandifolia*) are the commonest woods. On the more basic rocks ironwood (*erythrophloia*), bloodwood (*E. latifolia*), narrow-leaved ironbark (*E. crebra*).

Soils.—The soils are exceedingly poor. The district is useless but for mining, and consequently contains only a few mining camps, including Bamford, Wolfram, Lappa, and Koorboora.

[TO BE CONTINUED.]

A SUMMARY OF SOME EXPERIMENTS CARRIED OUT BY THE BUREAU OF SUGAR EXPERIMENT STATIONS—V.

By H. T. EASTERBY, Director.

The first article of this series, in the course of which Mr. Easterby discussed deep cultivation experiments and tabulated comparative crop results from subsoiled and non-subsoiled fields, was published in the May Journal. The second instalment, an account of the results of irrigation experiments and the action of irrigation and manures upon the density and purity of sugar juices, appeared in the June issue. The third instalment, treating of experiments in fertilisation, was published in the August issue; and last month's journal contained an account of distance experiments and resultant crops.—Ed.

(A)—INTRODUCTION AND TESTING OF CANE VARIETIES.

One of the principal objects of the Experiment Stations is the constant introduction of new varieties, and their commercial testing. Before any cane varieties are allowed to leave the Experiment Stations they have to pass chemical and commercial

trials through plant, first ratoon, and second ratoon crops. Each variety is tested not less than four times during the sugar season, so that records are obtained giving farmers and millowners information as to whether canes are early or late, and as to whether their sugar contents are sufficiently high to warrant their adoption. This is combined with agricultural trials on the field, so that it may be determined whether such varieties are good croppers. They are further rigorously watched for evidence of disease, and no affected canes are allowed to go into distribution. When varieties have passed these trials they are carefully examined and packed before being sent to growers living at a distance from the Stations. Farmers close at hand are invited to visit the Stations and remove the varieties selected for distribution. The worthless varieties are discarded. Information of this kind could only be secured by growers and millers at the expense of much time and money and the rejection of many useless canes by the mills, which would be accompanied by severe loss to the growers.

It is proposed in this article to shortly summarise the introduction of the different varieties introduced by the Department of Agriculture and the Sugar Experiment Stations, with the ultimate results.

1895 TO 1904.

During this period 110 varieties of cane were introduced upon the Mackay Sugar Experiment Station, of which—

12 were collected in New Guinea by Mr. Cowley.

74 were collected in New Guinea by Mr. Tryon.

8 were introduced from Mauritius.

4 were introduced from Hawaii.

4 were introduced from Trinidad.

3 were introduced from South Africa.

4 were old Queensland canes—viz., Rappoe, Meerah, White Bamboo, and Striped Singapore.

1 was introduced from Barbadoes.

110

From 1895 to 1901, 16 of these (all from New Guinea) died out, but, it having been ascertained that some of them were still in existence at the Kamerunga Nursery, 10 of them were reintroduced at Mackay. From 1901 to 1907 these varieties were most rigorously tested, and every chance to prove themselves was provided. It was found that many of the canes, while showing a good sugar content, were so light in weight and difficult to cut that they were valueless from the farmer's point of view, and were discarded. Others developed the disease, but those of high class as sugar producers were planted out upon new land and carefully nursed in the hope of their recovering, which, however, they failed to do, so they were also discarded. A further number were found to be of small commercial value, and were also discarded. Out of the 110 varieties, therefore—

87 were discarded,

8 died out,

15 were retained as of commercial value.

110

The 15 retained were ultimately reduced to 4—viz., New Guinea 15 or Badila, N.G. 24 or Goru, N.G. 24 A, Striped Goru, and N.G. 24 B Green Goru. The mean sucrose and purity of six years' analyses are summarised hereunder:—

Name or Number of Variety.	Average of the Six Years.	
	Sucrose.	Purity.
New Guinea 15 (Badila)	20.68	94.4
New Guinea 24 (Goru)	18.79	93.4
New Guinea 24A	19.19	93.1
New Guinea 24B	18.42	91.6

The crop results for the six years were as follows :—

CROP RESULTS, 1904-1908.

NAME OR NUMBER OF VARIETY.	PLANT CROP, 1904.		FIRST RATOON CROP, 1905.		SECOND RATOON, CROP, 1906.		THIRD RATOON CROP, 1907.		FOURTH RATOON CROP, 1908.		FIFTH RATOON CROP, 1909.		TOTAL YIELD, SIX CROPS.	
	Yield of Cane per Acre in English tons.	*Yield of Sugar per Acre in English tons.	Yield of Cane per Acre in English tons.	Yield of Sugar per Acre in English tons.	Yield of Cane per Acre in English tons.	Yield of Sugar per Acre in English tons.	Yield of Cane per Acre in English tons.	Yield of Sugar per Acre in English tons.	Yield of Cane per Acre in English tons.	Yield of Sugar per Acre in English tons.	Yield of Cane per Acre in English tons.	Yield of Sugar per Acre in English tons.	Yield of Cane per Acre in English tons.	Yield of Sugar per Acre in English tons.
New Guinea 15 ..	59.8	10.8	53.8	10.1	41.6	7.7	43.0	7.9	34.0	6.3	38.3	7.4	270.5	50.2
New Guinea 24 ..	63.5	11.1	51.8	8.5	33.0	5.5	54.0	8.9	61.6	10.2	Not Ratooned		263.9	44.2†
New Guinea 24A ..	58.9	9.6	51.3	8.9	36.7	6.3	41.0	6.9	42.1	7.3	36.7	6.5	266.7	45.5
New Guinea 24B ..	60.4	8.9	49.0	8.4	34.7	5.8	40.0	6.7	39.4	6.6	34.0	5.6	257.5	42.0

* The yield of sugar per acre means the actual sugar per acre produced by the crop, and not the amount recovered by the mills, which is a variable factor, depending on the modern or other character of each factory.

† Five crops only.

1905 TO 1908.

Ten Hambleton seedlings from the Colonial Sugar Refining Company were introduced upon the Mackay station during this period; also Mauritius Malagache, Barbadoes 147, and 6 Queensland seedlings. Of these the Hambleton seedlings 114, 222, 285, 426, 458, Mauritius Malagache, and Barbadoes 147 have been distributed and are still cultivated.

1909.

The following varieties were introduced during 1909, direct from Mauritius, viz.:—

Mauritius 779, 55, 87, 1237, 1022, 998, 1474, and 89.

Mauritius 189 and Gouve were also brought from the North to the Mackay station this year. Of these, M. 55, 87, 89, and 189 were distributed, and are still grown to a small extent.

1910.

During this year some 143 cane varieties were received by the Mackay station from the Acclimatisation Society in Queensland, and were planted out. These comprised Queensland, Barbadoes, and Demerara seedlings. They were received in very poor condition, being very dry and stunted, consequently only 98 germinated. Some of these later on died out, while others became affected with disease. Trinidad 211, Louisiana Striped, Demerara 117, and Demerara 604 were also introduced this year.

Of the above canes, the following were selected for distribution and are being cultivated:—

Name of variety.	Percentage of commercial cane sugar.
Q. 135	13.0
Q. 813	16.0
Q. 855	15.0
Q. 903	14.8
Q. 970	16.0
Q. 1001	14.5
Q. 1092	13.0
Q. 1098	15.5
Q. 1121	15.3
D. 1135	14.5
Hybrid No. 1	16.0
Badila Seedling	16.7

1912.

In September, October, and November of this year Mr. T. H. Wells obtained in New Guinea some 162 varieties. These were consigned to the Sugar Experiment Station at Mackay, where they were planted out by hand, special care being taken with each plant. These were thoroughly tested up till 1921, by which time nearly all of them were discarded as of little use to the industry, the commercial cane sugar content not being sufficiently high to warrant their retention and distribution, as they were not likely to be sought after by farmers in these days when the commercial cane sugar content is such a vital factor. There was nothing in the collection to come anywhere near Badila or the three Gorus. Of the 162 varieties, the following have been temporarily retained:—

Name of variety.	Percentage of commercial cane sugar.
N.G. 81	14.9
N.G. 89	14.7
N.G. 90	14.3
N.G. 94	12.5
N.G. 102	14.0
N.G. 103	15.0
N.G. 164	14.5

1914.

Two canes were introduced to the Mackay station this year—viz., Gingraya and Gingor. These were crosses raised by Mr. Croften, of Ayr, from Mauritius, Gingham, and Oraya, and Mauritius Gingham and N.G. 24 A or Striped Goru. The latter is a good cane, containing 16 per cent. commercial cane sugar, and has been retained and distributed.

1915.

Shahjahanpur No. 10 was introduced from India with the advice that it would stand cold weather well. Its resistance to frost has been well established at Bundaberg and many other Southern districts. Its sugar content and cropping qualities have been good. The commercial cane sugar is 15 per cent.

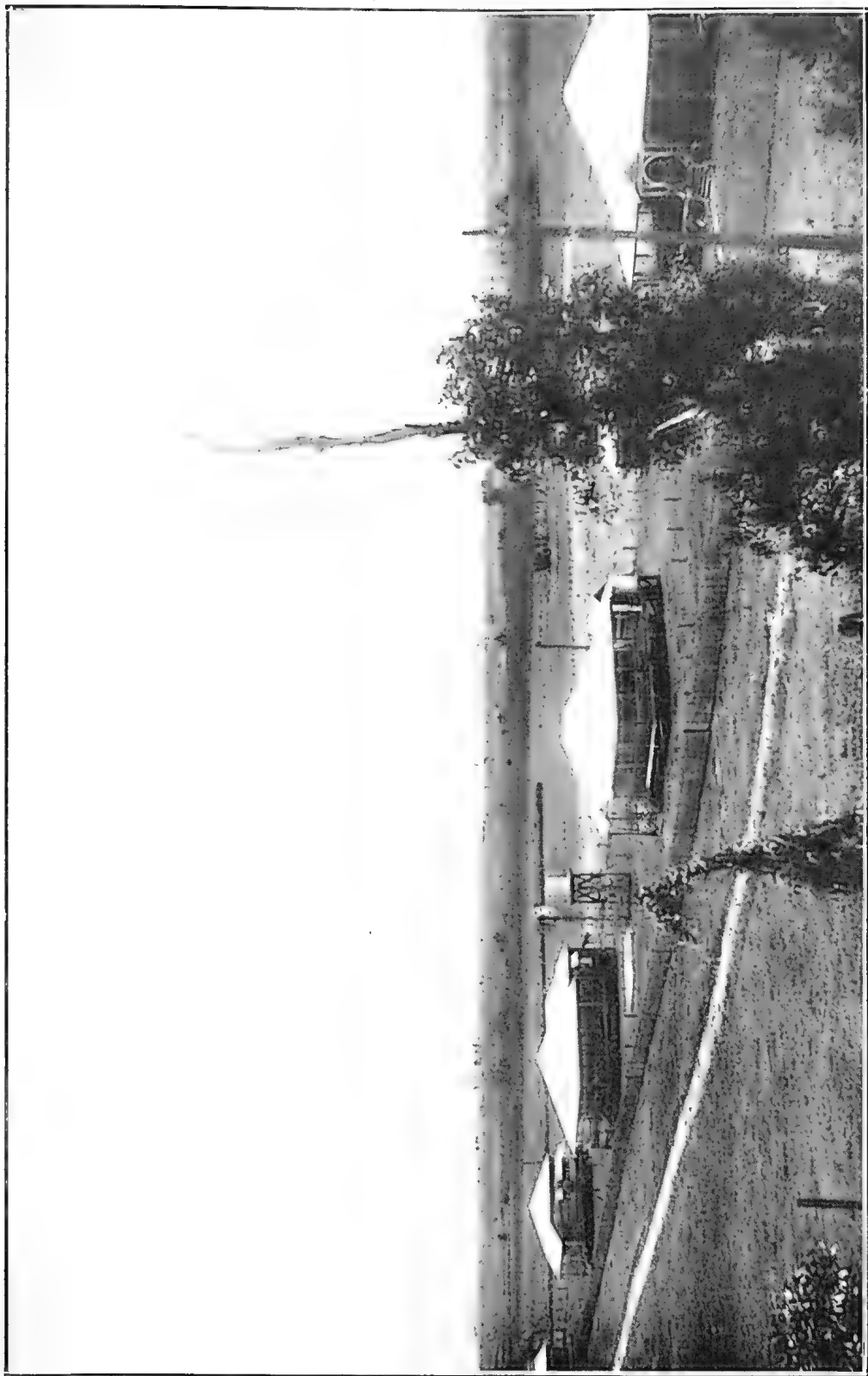


PLATE 57.—SUGAR EXPERIMENT STATION, SOUTH JOHNSTONE.

1916.

During this year the following varieties were introduced on the Bundaberg Sugar Experiment Station:—Mauritius 1504, 2904, 16804, 22204, Java E.K. 1, E.K. 2, E.K., 28, 100 Bont, 247 Generatic; and to the Mackay station per favour of the Colonial Sugar Company, from Fiji:—8 R. 431 and 7 R. 428. The only Mauritius cane out of those introduced this year that has been retained is M. 16804. All the Java canes have been retained so far, and E.K. 1 and E.K. 28 are very promising canes, and have been distributed. The 7 R. 428 or "Pompey" is also a good cane, and has been distributed.

1917.

From the Experiment station at Hawaii the Bundaberg Sugar Experiment Station received the following three canes, viz.:—H. 109, 146, and 227. The Mackay Station received from the West Indies B. 4030, 6450, 254, 4596, 6204, 4934, and Demerara 109; while the Colonial Sugar Refining Company supplied Obo Badila from New Guinea. Of these, B. 254, 6204, and 4934 died out. The three Hawaiian canes have been tested and are being distributed. The remainder of the West Indian canes are still under examination. Obo Badila has been distributed to canegrowers. It is apparently the same as the old N.G. 15 or Badila, but a new introduction.

1919.

This year a new lot of Mauritius canes was introduced—viz., M. 3210, 2810, 131168, 551182, and 5511. These are still being examined.

1921.

The following seedlings, which were discovered in the sandy bed of the Mowbray River, near Mossman, were sent to the Bureau by courtesy of the Mossman Central Mill Company:—Mossman Queensland 1, 2, 3, 4, 5, 6, and 7. These are being tested at the South Johnstone Sugar Experiment Station. No. 1 is a cane similar to Badila, and has been distributed. The remainder are still being tested. A further shipment of Mauritius canes, as follows, were also received at the Bundaberg Sugar Experiment Station—viz., Mauritius 6414, 55143, 21958, 3395, 131126, R.P. 6, R.P. 8, and R.P. 73. These are still under examination. Two hundred seedlings were raised at the South Johnstone Sugar Experiment Station during this year and have been planted out on the field.

1922.

Fresh introductions of cane from foreign countries are being made this year.

GENERAL.

The beneficial results of the work undertaken at the Experiment Station in the constant introduction and selection by cropping and chemical testing cannot be over-estimated. No cane has a perennial existence; sooner or later, if constantly grown, it is bound to fall a victim to disease, and the Bureau must be on the constant lookout for new canes. That only a few canes of commercial value can be obtained from large numbers tested is, of course, well known. Out of many thousand seedlings raised in Queensland only a few were finally selected. In Barbadoes over one million seedlings were raised, yet only four are in general use. At Demerara the same story obtains, there being only some seven canes that are of value out of considerably over a million raised. The farmer cannot undertake this work for himself, and must look to the Experiment Stations for the introduction of new canes. A very great expenditure in time and money is thus saved to the grower. If no more had been done than the introduction of the two canes Badila and Gorn into Queensland, it would have amply justified all the money that has so far been spent on Sugar work.

TESTING OF CERTAIN VARIETIES OF CANE AT MACKAY.

Tests made at the Mackay Sugar Experiment Station for the purpose of determining the relative richness of H.Q. 426 (Clark's Seedling), N.G. 15 (Badila), N.G. 24 (Goru), Cheribon, Malabar, and Otamite.

A series of analytical test plots were instituted at the Mackay station in 1913 to determine the relative values of H.Q. 426, Badila, Goru, Cheribon, Malabar, and Otamite during the crushing period, June to December. The first series of these experiments were planted in the early part of the season—viz., March—and the second series in August of the same year. With the exception of time of planting, the conditions governing the experiments were the same in each case. Analyses of these two

plant crops of different ages were commenced in June, 1914, and continued till December of the same year. In the following year, 1915, the first ratoon crops were again tested over a similar period, as were the second ratoon crops in 1916. They showed conclusively that over the seven months the H.Q. 426, Badila, and Goru were of considerably higher sugar content than Cheribon, Malabar, and Otamite. The latter canes show a low analyses for the first three months, but from September onwards they considerably improve.

The results of the three crops from the early and late plantings are summarised hereunder:—

IN THE TABLE FOLLOWING THE RESULTS HAVE BEEN AVERAGED FOR THE THREE YEARS SO THAT THE SUGAR CONTENTS IN THE TERMS OF C.C.S. ARE APPARENT AT A GLANCE.

VARIETY.	PLANT CROP, 1914. Average 7 Months' Analyses.				FIRST RATOON CROP, 1915. Average 7 Months' Analyses.				SECOND RATOON CROP, 1916. Average 7 Months' Analyses.			
	Early Planting. C.C.S.		Late Planting. C.C.S.		Early Planting. C.C.S.		Late Planting. C.C.S.		Early Planting. C.C.S.		Late Planting. C.C.S.	
	%	%	%	%	%	%	%	%	%	%	%	%
H.Q. 426	16.0	16.6	18.4	18.8	14.9	15.0	14.9	14.9	14.5	15.0
Badila	15.1	16.6	19.8	18.7	14.9	14.5	14.9	14.9	14.5	14.5
Goru	13.2	13.9	17.0	16.4	12.7	12.2	12.4	12.4	11.7	12.2
Cheribon	12.6	12.6	15.6	15.5	11.4	11.3	11.4	11.4	11.3	11.3
Malabar	11.8	11.8	15.0	15.3	11.4	11.3	11.4	11.4	11.3	11.3
Otamite	11.0	11.4	15.0	15.0	11.5	11.0	11.5	11.5	11.0	11.0

Although the three latter canes are not much grown outside Mackay, the results are generally interesting, particularly having regard to the action of the Central Sugar Cane Prices Board in fixing, in most instances, analyses as the basis of payment for cane.

CERTIFICATES OF SOUNDNESS.

Certificates of Soundness as under-listed were issued in the course of September, 1922 :—

Name of Stallion.	Breed.	Period for which Certificate issued.	Owner's Name.	Owner's Address.
Silver Son ..	Blood ..	Life ..	F. Dreyer ..	Eagleby, Beenleigh
Veresdale ..	Blood ..	Life ...	W. Elliott ..	Veresdale, Upper Logan
Some Wilkes..	Trotter ..	Life ..	C. F. Pinnaud ..	Eagleby, Beenleigh
Spark ..	Trotter ..	Life ..	J. E. Wallace ..	Red Hill, Gympie
Marvin Cole ..	Trotter ..	12 months	H. Dunkley ..	Withcott, <i>viz</i> Helidon

"BUNCHY TOP" DISEASE IN BANANAS—INTERESTING EXPERIMENTS.

Mr. T. Brooks, of Highfield, Murwillumbah, claims to have discovered a cure for the "bunchy top" disease in bananas. In 1920, Mr. Brooks treated portion of his plantation with sulphur, but this did not have the effect desired. In May last, root rot set in, and in December it appeared as if the whole plantation was "settled." Mr. Brooks now contends that the sulphur applied last year, at the rate of about 8 cwt. per acre, together with island fertiliser, plays an important part in the treatment he is now applying. He has started with a mixture which he calls basic super, which contains 45 per cent. lime and 17 per cent. phosphoric acid. This was applied in some cases around the stools to a radius of 3 feet or 4 feet, in two plots. The whole surface was treated with from 8 cwt. to 10 cwt. per acre, and the suckers before being planted were well dusted with the mixture. All suckers planted were taken from "bunchy top" stock, but of the 800 planted since April not one, so far, appears to be affected with the disease. On the contrary, every leaf shows splendid colour, and the stems are strong and vigorous, while the growth for this time of the year is exceptional. Old stalks up to 5 feet high, which obviously were badly affected with the disease, are now throwing out vigorous centre leaves and evidencing fullness of sap.

Although the experiments are only in part developed, and a whole season is necessary to stamp them as conclusive, the hearty growth of every plant treated, and the unusual crop of peas, beans, and other vegetables, demonstrates that Mr. Brooks has developed a wonderful growth force in his soil.

Mr. Brooks is making his discovery public in order that it might form a base for further experiment should it fall short of expectations. His line of reasoning is that the application of the sulphur renders the phosphates soluble, so that they can be readily taken up by the plant, hence the rapid growth following the sulphur treatment. But this also allowed the heavy autumn rains to wash the phosphates out of the soil, which accounts for the return of the disease after the rain last year. The sulphur remaining in the soil acts as a fungicide, and connecting with the basic super, assists the restoration of the lost sulphates. The lime contents give a warmth and sweetness and stimulate the root growth.

Discussing the matter recently, the Minister for Agriculture and Stock (Hon. W. N. Gillies) remarked that developments in this connection were being closely watched, and that his Department is in communication with the New South Wales authorities on the subject. From departmental information there is very little evidence of "bunchy top" in Queensland.

SCIENCE NOTES.

By EDMUND JARVIS, Entomologist, Bureau of Sugar Experiment Stations.
THE INFLUENCE OF CHEMOTROPISM ON *LEPIDODERMA ALBOHIRTUM* WATER.

The chemotropic response of insects to artificial stimuli is a subject worthy of close investigation, and one which presents a wide field of possibilities in connection with the control of various destructive species.

Most entomologists are aware of the fact that insects as a rule react positively, or, in other words, are attracted towards their food or that of their future offspring by

the presence of various odours emanating from it; which, although of a nature far too subtle for us to perceive, are, nevertheless, appreciable to creatures endowed with highly specialised olfactory organs.

Chemotropic reaction occurs also during the periods of mating and oviposition, the sexes in many instances being able to approach and find each other from long distances by the help of certain odours secreted by special scent-glands; while the egg-laden female is similarly guided during her search for suitable food for the future larvæ.

Entomologists have not been slow to realise the economic significance of this method of combating insect pests, much attention having been given of late years to the construction of bait-traps for attracting fruit-flies, vine-moths, &c.

With regard to the question of controlling our grey-back cane-beetle by means of aromas, we have good reasons for assuming that the movements of this insect are very sensibly affected by forces of a chemotropic nature, which probably exercise important influences on the flight of the females during the period preceding oviposition.

Initial experimentation with aromas was carried out by the writer in December, 1915, when it was discovered that grey-back beetles reacted negatively towards such odours as cajeput oil, acetic and carbolic acids, nitro-benzine, oil of almonds, &c. but were not in the least influenced by odours arising from oil of cloves, fish oils, or even the fumes of 40 per cent. formalin.

The olfactory sensibilities of this species, however, were amply demonstrated, and I felt justified in believing that reaction of a positive nature was certainly attainable.

With a view to securing further data in this connection, these experiments were continued last December (1921); the odours used being placed in small tins 4 inches deep by 3½ inches in diameter, and resembling those emitted by the stem and foliage of chief food-plants of the beetle, together with miscellaneous aromas such as arise from decaying vegetation, soils, roots, &c.

Some of these bait-traps were exposed in cane fields, being simply let into the ground between rows of cane, with the top edge of the tin level with the surface, while others were hung among the branches of a large native fig (*Ficus pilosa*), which is a favourite feeding-tree of the beetles (*see* photo. in "Queensland Agricultural Journal," Vol. xvii., p. 38).

With regard to the anatomy of the antennal organs in *Lepidoderma*, it will be noticed by the accompanying illustrations that the four plates composing the club are closely covered with olfactory pits or pori (Fig. 1), each containing a central peg-shaped body of very variable form and length, usually tipped with a short seta or bristle.

An outline of a vertical section of four of these pits is shown greatly magnified at Fig. 2, and a plan of two of them at Fig. 3.

Each peg is connected with the olfactory nerve by means of a delicate fibre, indicated diagrammatically in the section at Figs. 4, 4.

These pits, which occur in the chitinous portion of both sides of the two inner lamellæ of the female and on the inner surfaces of the outer plates, number about 18,500, and in male specimens 24,500.

In the latter sex, however, the club consists of five plates, the fifth being one of the outer ones, and usually smaller than the others.

Whilst feeding or resting on the trees in a torpid condition, the antennal lamellæ are held close together in the form of a solid-looking club, but when flying, or under the influence of excitement, the beetle opens them out fan-wise, in order to expose to the air the greatest number of olfactory nerve fibres.

There can be little doubt that the highly sensitive antennæ of this insect help it to locate the position of favourite feeding-trees, since isolated specimens of such figs as *Ficus pilosa*, *cunninghami*, &c., are usually loaded with beetles each season, although often growing alongside or close to food-plants that happen to be less palatable.

We are making preparations for experimenting during this coming season with a large variety of aromas, comprising various essential oils and aromatic essences, &c., distilled or extracted by the process of enfleuragé from favourite food-plants of our grey-back cane-beetle.

I have already pointed out the importance of this ideal control method (Reports Sept. 1914 and Nov. 1921), which may enable us to capture the female beetles before they have had time to deposit eggs.

In the event of success in this connection being obtained, it would then be a comparatively simple matter to design suitable traps of a mechanical nature that, when baited with the attractive aroma could be so arranged in cane fields as to lure to destruction most of the invading beetles.

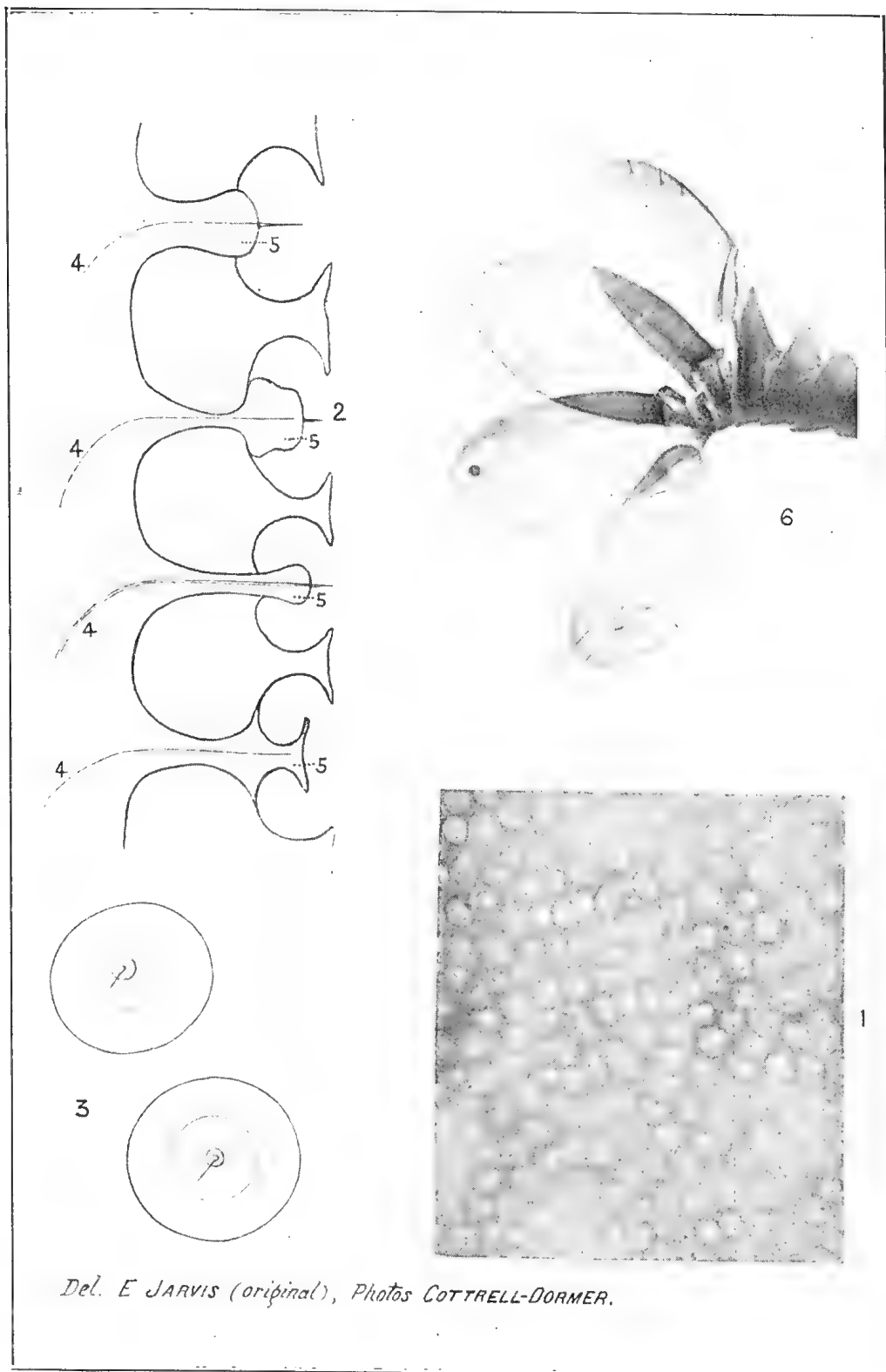


PLATE 58.—(For description, see page 310).

DESCRIPTION OF PLATE.

- 1.—Olfactory pits in lamella of antennal club of *Lepidoderma albohirtum* Waterh.
× 620.
- 2.—Diagrammatic section through same, showing four pits containing central pegs with apical setæ (5, 5.); connected with olfactory nerves (4, 4.)
× about 9,000.
- 3.—Plan of two olfactory pits, showing sensitive pegs.
- 4.—Antennal club of female with lamellæ opened out. × 28.



Photo: G. H. Worth.]

PLATE 59.—COCOANUT TREE ON JOHN DANIEL JOYCE'S
PLANTATION, "WAI VURI," INNISFAIR.

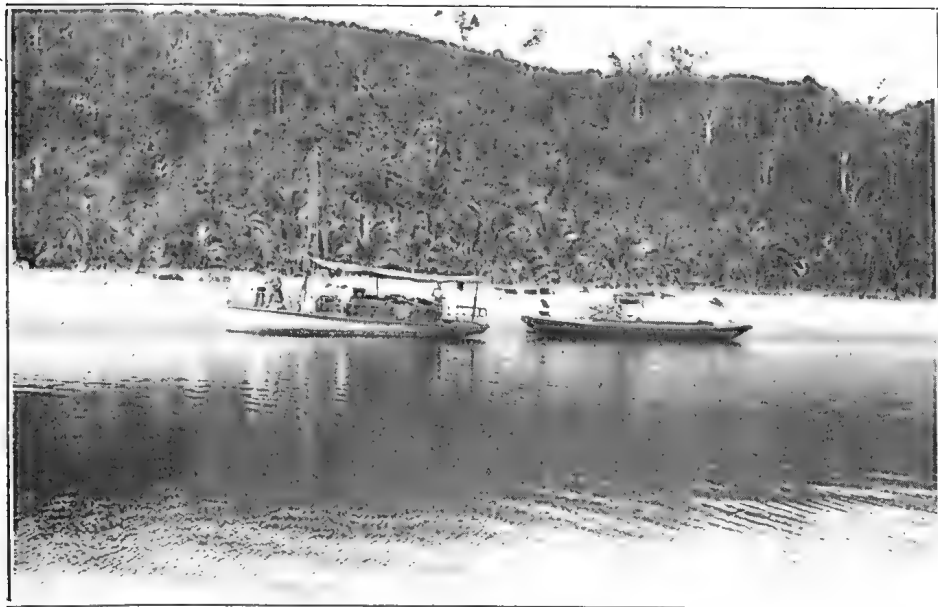


Photo: G. H. Worth.]

PLATE 60.—JOHN DANIEL JOYCE'S PLANTATION, "WAI VURI," INNISFAIL.

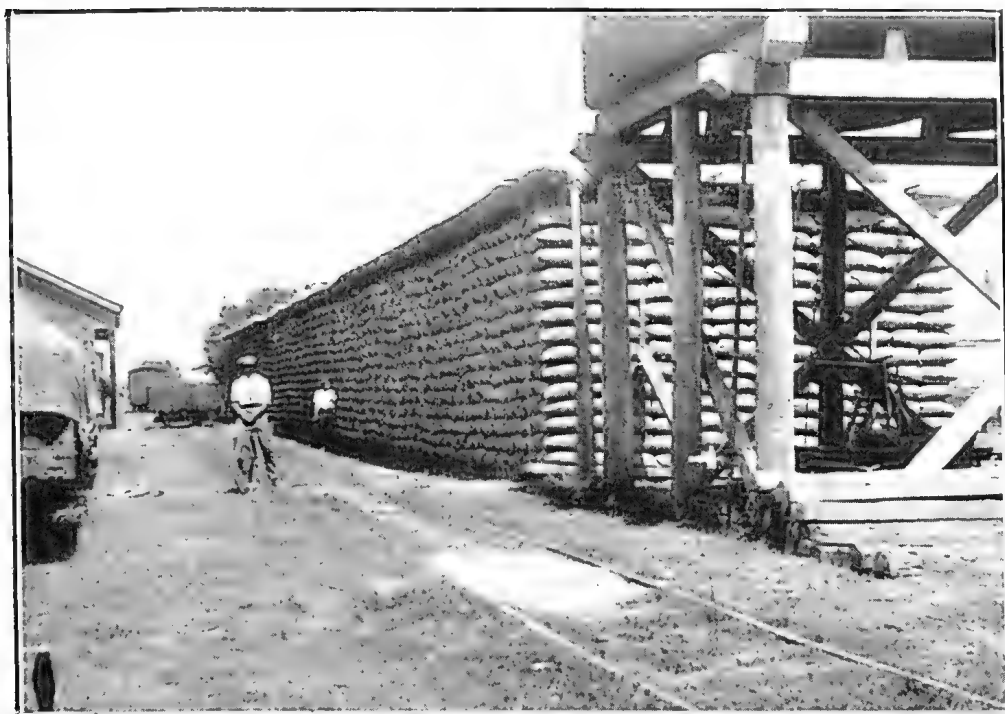


PLATE 61.—14,000 BAGS OF F.A.Q., ALLORA WHEAT DUMP, 1922.

SOME PRIZE-WINNERS, ROYAL NATIONAL SHOW, BRISBANE, 1922.

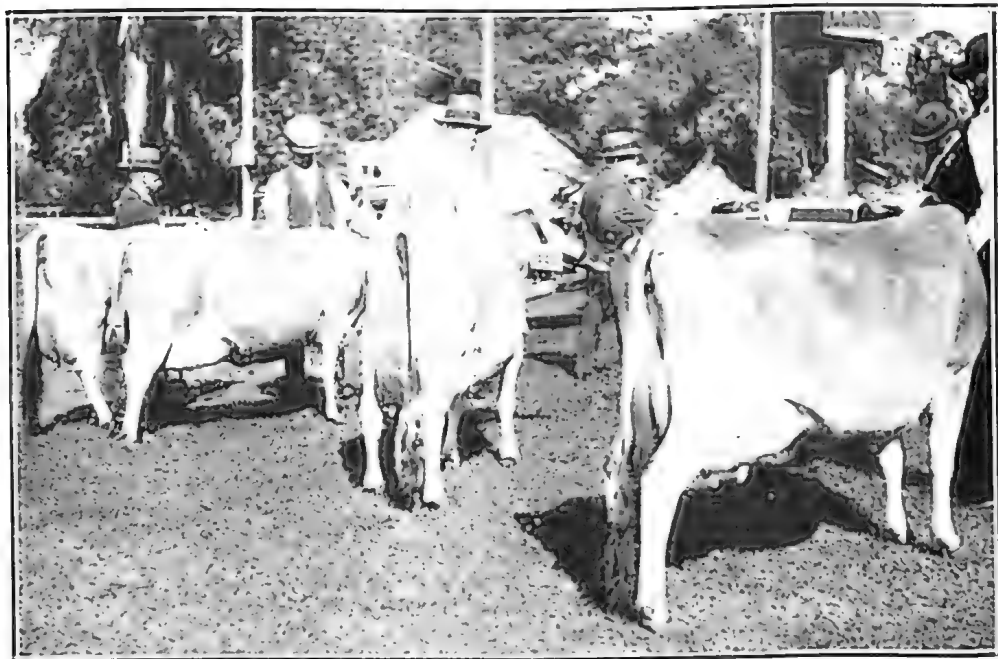


PLATE 62. JUDGING THE JERSEYS.

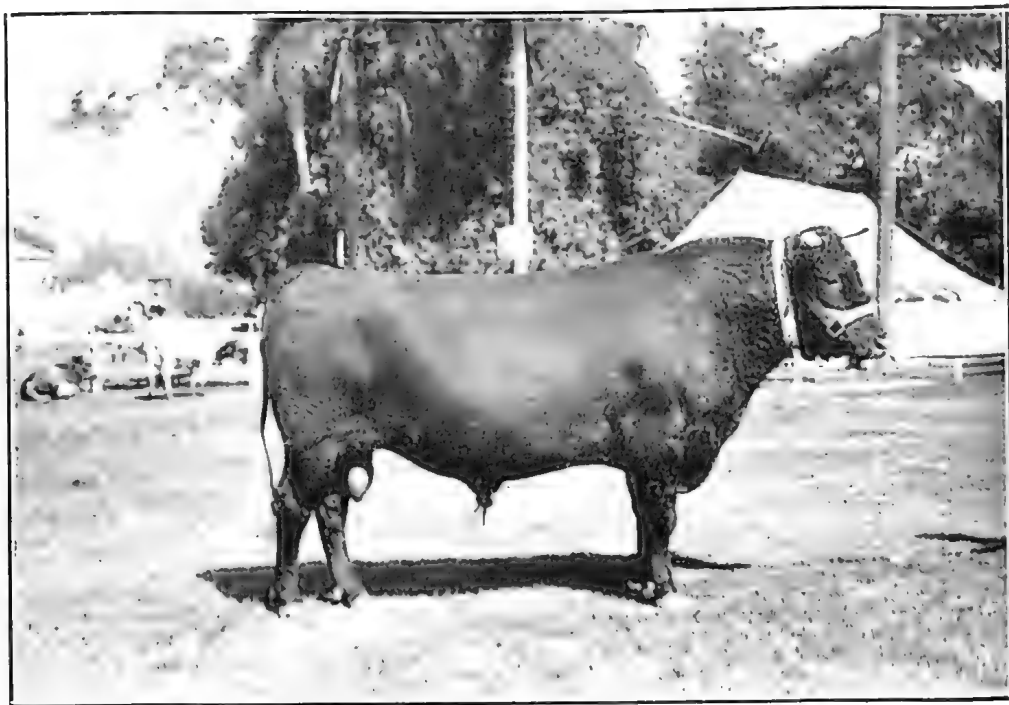


PLATE 63.—I.M.S. BULL, THOR OF GREYLIGH. The property of G. E. J. Chaseling, Brundah, Coolabunia, Q.



PLATE 64.—A CLOSER VIEW OF THOR OF GREYLEIGH, WINNER OF THE THREE-YEAR-OLD I.M.S. BULL CLASS, AND ONE OF THE NICEST SPECIMENS OF THE BREED THAT WE HAVE AT PRESENT IN QUEENSLAND.

He is a son of Joffre and Dandy 4th of Greyleigh. First in the powerful three and under four class, National, 1922. His wins include first and champion at Wondai, 1922; first and champion at Murgon, 1922; first for bull and progeny at both the before-mentioned shows, and many other prizes.

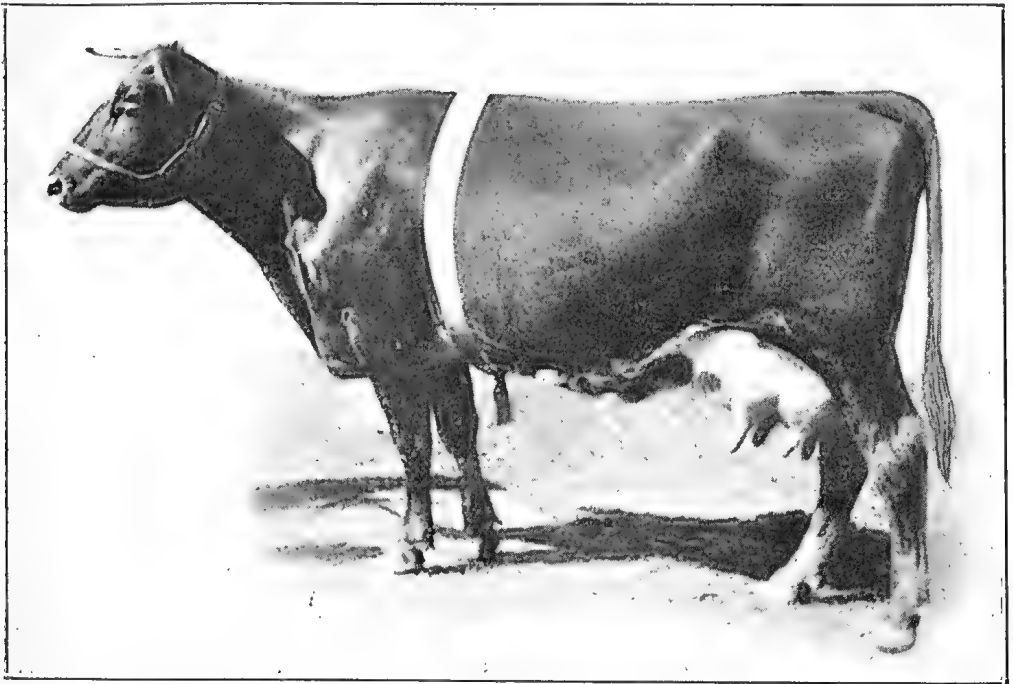


PLATE 65.—FUCHSIA OF STRATHIDHU (431).

By Victor 2nd (27), dam Carnation. First prize I.M.S. cow five years old and over, in milk, and champion. Bred by and the property of S. Mitchell, Warwick, Q.



PLATE 66.—MARGARET ANGLIN 2ND OF BERRY (81).

By Powerful of Brundee, dam Margaret Anglin. First prize and champion Friesian cow. (Record, 13,200 lb. milk and 533.76 lb. butter in 273 days.) The property of Mr. S. H. Hosking, St. Gwithian, Toogoolawah, Q.



PLATE 67.—MAUD ROOKER KORNDYKE (IMP., 589).

By Tsussie Rajah, dam Minnie Rooker Tsussie. First prize Friesian heifer, 2 years and under 3 years, in milk, and Reserve Champion, Brisbane Royal National Show. The property of Mr. Fred G. Brown, Mooroombin, Toogoolawah, Q.



PLATE 68.—CHAMPION FRIESIAN BULL, MENELENS OF ST. ALBANS (MCLEOD).

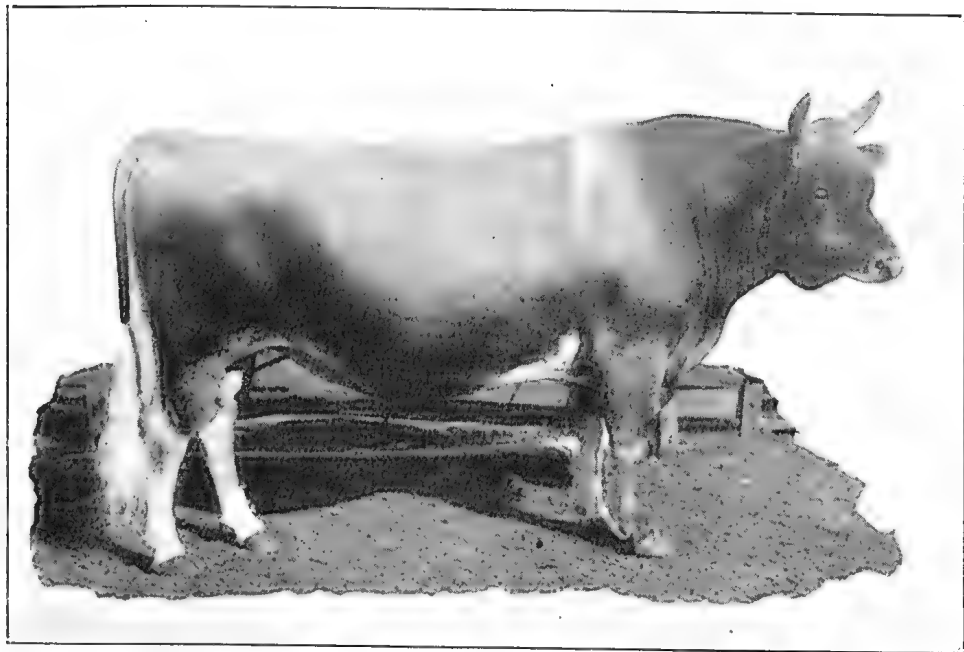


PLATE 69.—OXFORD PALATINE SULTAN (1126),

By Prince Palatine (imp., 760), dam Sultane 4th of Oaklands (imp., 1398). Third prize Jersey bull four years old and over. The property of Mr. W. S. Conochie, Brooklands, Tingoor, Q.

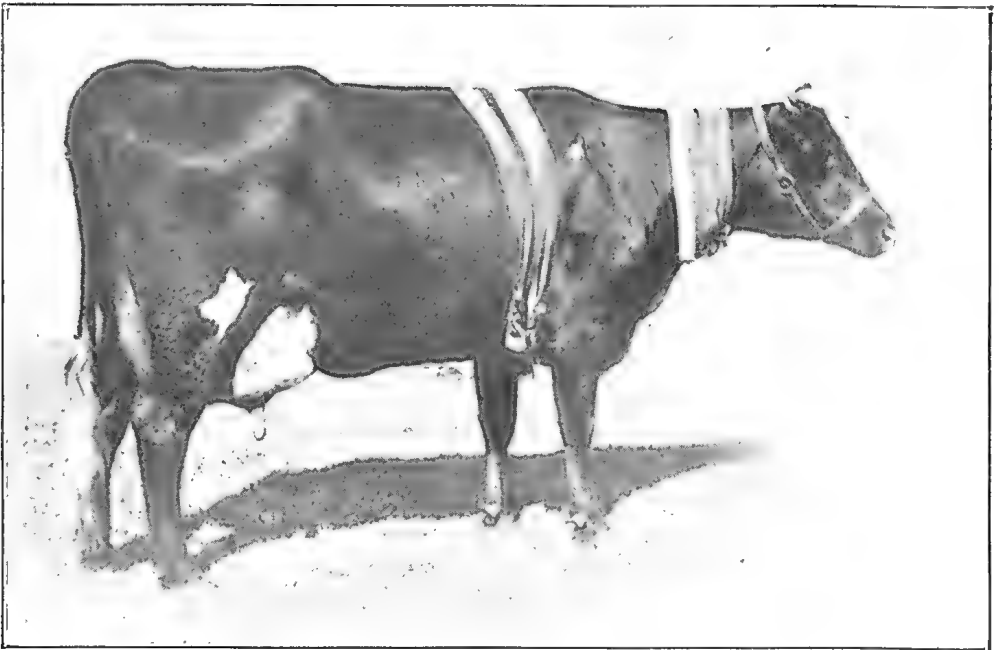


PLATE 70.—JEAN 5TH OF BLACKLANDS (303).

By Sir Hugh of Hillview (26), dam Jean 4th of Blacklands (100). Second prize cow, five years old and over, in milk, and reserve champion. Bred by and the property of A. Pickels, Blacklands, Wondai, Q.



PLATE 71.—LORNA OF ARLEY (50).

By Captain, dam Lady. First in both classes for cow, four years old and over, averaging the greatest daily yield of butter fat for 48 hours, with 6·587 lb. butter; winner of the special prize for cow, four years old and over; second in class for cow yielding the largest supply of milk in 48 hours, with 132·9 lb.; and winner of the National champion butter fat test. Bred by and the property of E. D. Lawley, Arley, Maleny, Q.



PLATE 72.—JELlicOE OF MARINYA (914).

By Gordon of Marinya (186), dam Iduna of Marinya (515). First prize Bull, three years old and under four years, and champion Ayrshire bull of Queensland, Brisbane Royal National Show. Bred by and the property of J. H. Fairfax, Marinya, Cambooya, Q.



PLATE 73.—SOVEREIGN OF WARDEN (P.I. I.M.S.H.B. OF A.).

By Ensign of Warden, dam Folly. First prize I.M.S. bull, four years old and over, and champion. The property of F. O. Hayter, Spurfield, Pomona, Q.

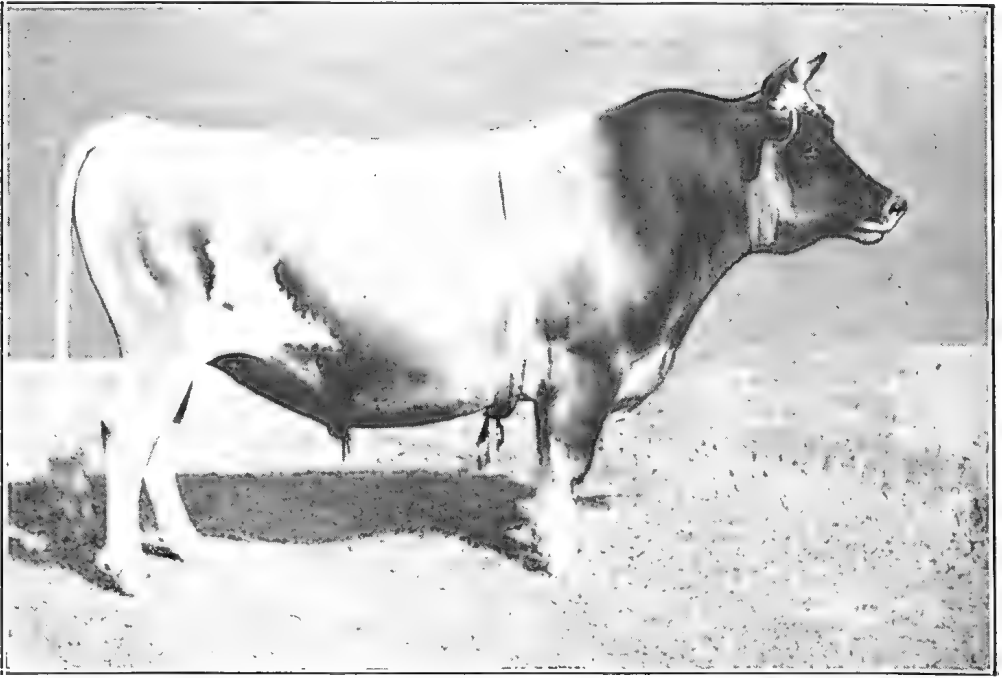


PLATE 74.—OXFORD GOLDEN NOBLE (1128).

By Prince Palatine (imp., 760), dam Oxfordia of Oaklands (1397). First and Champion Jersey bull; first for sire and three of his progeny, first in exhibitor's group, first in sire's progeny stakes group. This is the third year in succession that he has won the championship. Bred by and the property of E. Burton, Wanora, Q.



PLATE 75.—CHARM'S DUHALOW OF OAKVALE (P.I. I.M.S.H.B.).

By Gem's Plum of Hillview, dam Charm of Glenthorn (213). First and reserve champion, and first in both groups. The property of Ben. O'Connor.

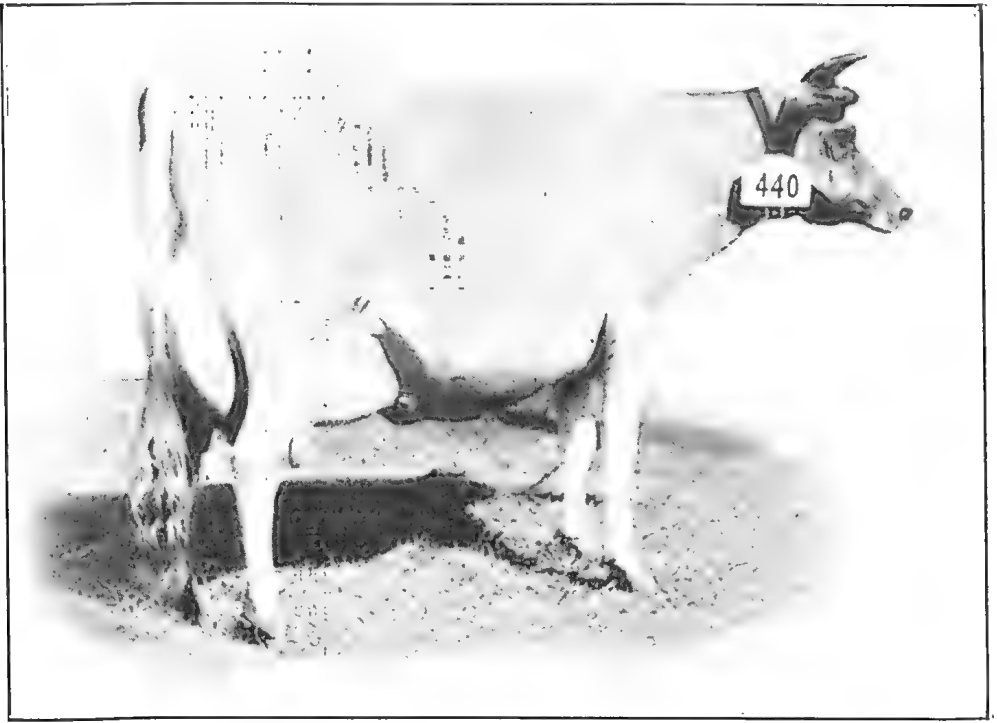


PLATE 76.—OXFORD GIRL (2210).

By Passy's Golden King (382), dam Buttergirl (411). Second prize cow, 5 years and over, in milk; first for Australian-bred Jersey; and reserve champion, Brisbane Royal National Show. (Record 2·005 lb. butter in 24 hours.) Bred by and the property of E. Burton, Wanora, Q.

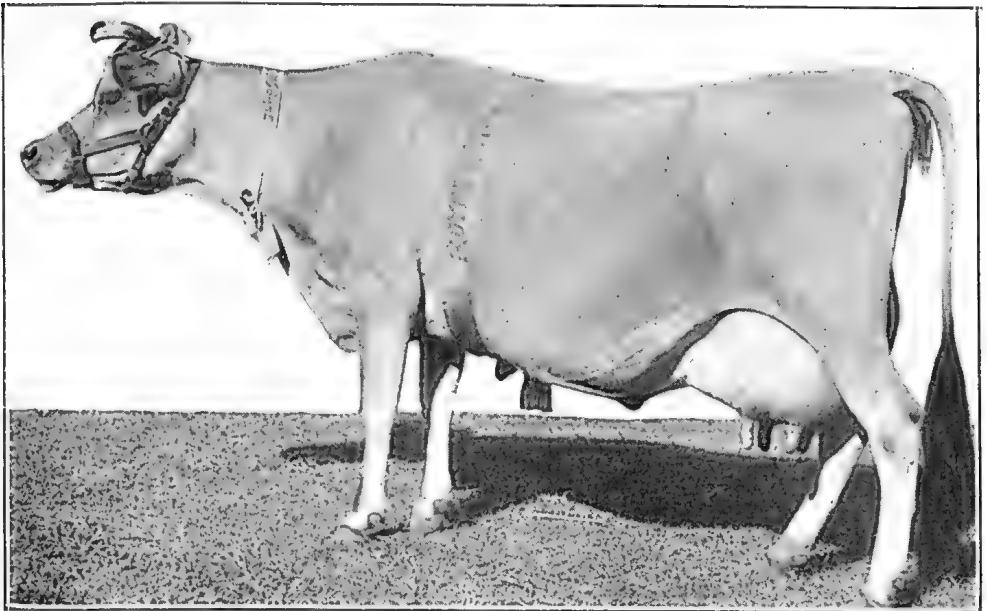


PLATE 77.—LARKSPUR.

Champion Jersey Cow, and lately the property of W. and D. Carr, Indooroopilly. Larkspur, a great prizewinner in every Jersey class in the show ring, died last month.

Editorial Notes.

Building up The Agricultural Industry.

It is believed that the Queensland Producers' Association will do much towards building up a real rural civilisation in this State. It is an outcome of a great movement, a movement inspired by a big ideal, possessing strong dynamic power governed by a great central idea. It is a movement which even now seems much bigger to those outside it than to those inside it. A man on the edge of a crowd can best measure its greatness and force. Complete organisation of the agricultural industry is now being transferred from the sphere of academic argument to the field of fundamental fact. Perhaps the most encouraging thing about the organisation now going on in Queensland country districts is the caution with which the proposal has been received and the restrained enthusiasm of those by whom it has been accepted. Experience shows that many similar movements have often been spoilt at the outset by being overwhelmed with the rush and gush of unrestrained rhetoric and the badly balanced zeal of unthinking enthusiasts; but when a movement is based solidly on business principles and guided by men of experience and broad vision, who are capable of thinking nationally as well as sectionally, then its success follows in natural sequence.

* * * * *

There can be little orderly building in an industry unless the people concerned are of one mind. There must be an idea, in the sense of vision, of larger results and better conditions common to the greatest number. Legislation can make, provide, and has provided the plans and specifications of a great rural development in Queensland, but the farmers must do the building. The hope of prosperity by ballot is the last excuse between them and the stern realities of hard work and paying the price. Men and women do not grow strong except by overcoming obstacles.

* * * * *

To those of us who have had an opportunity of studying on the spot the conditions of agriculture in the older countries, there appears to be one big difference between farming in Australia and in Europe. Here farmers produce crops and let their industry go at that. They stop at production. Someone else prepares the product for market and markets it. In Europe farmers do not let their interest in their produce end when the last load has gone over the weighbridge. When their crops are bagged, bailed, and crated, individualism ceases, and co-operation is applied to prepare their produce for market, control its sale, and finance the whole operation. In Queensland to-day agriculture stands on one foot; in Europe it stands on four. With agriculture thoroughly organised and backed by statutory power, anomalies should cease to be, and rural life and industry should regain its rightful place as the most vital factor in our national life.

* * * * *

Civilisation was not built on a few square miles of bricks and concrete. Cities grow big because they suck up the wealth of the country. Babylon and Nineveh built their skyscrapers on the energy of the toilers on the soil. Ancient Rome was a humanity-absorbing vortex. These cities were great, but their greatness was not a source of pride in the hearts of the farmer who starved that their citizens might feast, who grew the grapes to make their masters drunk. If farmers are to obtain and retain a fairer reward for their energy and enterprise, if they are ever to enjoy the comforts and advantages of a real civilisation, they must make it their steady, persistent, and fundamental policy to work towards complete control over the manufacture and sale of their primary products. Such a policy comes well within the ambit of the Queensland Producers' Association, an association whose sponsors and constituents are alike bent on realities.

Event and Comment.

Agricultural Legislation.

The present Parliamentary session is noteworthy for the number of measures dealing with various phases of the agricultural industry. Included among the legislative proposals submitted were the Water Power Bill, Primary Products Pools Bill, Irrigation Bill, Fruit Cases Act Amendment Bill, and Lands Act Amendment Bill. Among the more important agricultural measures that have already become law is the Agricultural Education Act, and by the time this reference appears it is presumed that all the agricultural measures of this session will have become listed among our statutes.

The Primary Products Pools Bill.

As outlined by the Minister for Agriculture (Hon. W. N. Gillies) in the course of his second reading speech, this Bill is of considerable importance to Queensland. Its object is to give the Governor in Council power to proclaim any primary product a product within the meaning of the Act, and to bring into existence a committee or pool to control that industry. It is not experimental, for there are already in existence two Pool Acts in this State covering selling operations in wheat and cheese. The measure is a simple one, and is based on the Wheat Pool Act. The success of the wheat and cheese pools has justified the enactment of general pooling legislation. One of the advantages of the pooling system is that it is an extension of the co-operative principle, bringing the whole of the producers in any section of the agricultural industry together, enabling them to handle their commodity in bulk, financing their business as it can only be financed under such a scheme, regulating the market, reducing intercepted charges, and eliminating speculation in farmers' produce. A study of our existing marketing system discloses the illuminating fact that probably only a little over 30 per cent. of the price paid by consumers for commodities produced by the farmer is received by the farmer. The principal clause of the Bill is clause 3, which provides that—

"The Governor in Council may from time to time by Order in Council declare that any grain, cereal, fruit, vegetable, or other product of the soil in Queensland, or any dairy produce or any article of commerce prepared other than by any process of manufacture from the produce of agricultural or other rural occupations in Queensland, is and shall be a commodity under and for the purposes of this Act."

"The Government do not wish to force a pool on any section unless the majority of the growers require it, and they think that it is quite sound to make the minority of 25 per cent. agree to the pool when the other 75 per cent. require it," declared Mr. Gillies in the course of a further explanation of the provisions of the measure.

The Irrigation Bill—Dawson Valley Scheme.

The purpose of this Bill is to obtain the necessary Parliamentary sanction to go on with the preliminary work of investigation in connection with the Dawson Valley scheme, and also to provide machinery for the proper control of schemes of that kind. In the course of the discussion on the second reading, the Treasurer (Hon. E. G. Theodore) said, in relation to the Dawson Valley project, that it had all the potential advantages of a very successful scheme. "It is possible," continued Mr. Theodore, "to store a large quantity of water at a comparatively moderate expenditure. The site of the dam has all the natural features required for the accumulation and storage of water, which will not be very far distant from the land to be irrigated. The whole of the land embodied in the scheme and coming within the influence of the scheme will be served by gravitation from the storage supply. The irrigable land is very extensive. It is of high-class quality, and there will be more land than there is water to supply, so there is no deficiency of irrigable land. Looking at it from the point of view of soil analysis, location, distance from ports, and everything else, it should result in a highly successful irrigation scheme."

Fruit Standards and Packing.

Speaking on the Fruit Cases Act Amendment Bill, the Minister for Agriculture (Hon. W. N. Gillies), who had charge of the measure, remarked on the difficulty of setting up standards for some of our fruits, but efforts would be made to set up standards for all our leading fruits. The Bill provides for the cross packing of bananas in standard cases containing 3,504 cubic inches. The Cavendish variety will be graded in three qualities. Choice bananas are to be of a minimum length of 9 inches with a minimum circumference of 5 inches, the fruit to be free from blemish. First grade bananas are to be of a minimum length of 7 inches with a minimum

circumference of 4 inches, and so on. "We have been able," Mr. Gillies continued, "to profit by experience with regard to legislation in the South dealing with standardisation of fruit. I am sure the Bill will make for the benefit of the producers, and I think the consumers will also benefit, too."

Butter and Cheese Production.

Some striking figures illustrating the expansion of the dairying industry in Queensland were quoted by Mr. F. M. Forde, M.L.A., in the course of a speech on the Primary Products Bill recently. After referring to the wide disparity between the prices of Australian butter and of the dairy products of other countries on the London market as a result of a lack of a complete oversea selling organisation, Mr. Forde said that the dairying industry is of growing importance to Queensland, and its protection and encouragement are very necessary. From the Department of Agriculture and Stock he had received some very interesting tables showing the annual production and value of butter and cheese in Queensland since 1915. The information he received is tabulated as under—

QUEENSLAND BUTTER PRODUCTION.					Value.
			lb.		£
1915	..	..	25,456,714	..	1,560,359
1916	..	..	28,967,279	..	2,051,848
1917	..	..	38,930,690	..	2,818,419
1918	..	..	32,371,575	..	2,765,071
1919	..	..	26,213,514	..	2,129,848
1920	..	..	40,751,373	..	5,093,922
1921 (estimated)	..	..	58,165,352	..	4,725,935

QUEENSLAND CHEESE PRODUCTION.					Value.
			lb.		£
1915	..	..	4,383,410	..	178,076
1916	..	..	8,495,825	..	345,143
1917	..	..	11,142,114	..	452,648
1918	..	..	8,636,700	..	386,855
1919	..	..	8,296,318	..	388,889
1920	..	..	11,512,262	..	623,580
1921 (estimated)	..	..	13,079,124	..	667,579

The Queensland Poultry Industry.

In the course of his annual report, the Poultry Instructor (Mr. J. Beard) remarked that, with the exception of one or two districts, he found the poultry industry in a very flourishing condition. This was noticeable in the increased number of poultry farmers and stock, and the larger quantities of eggs coming on to the market. The increase for July over the corresponding month of last year was 54 per cent. and August, 60 per cent. Prices were from 15 per cent. to 20 per cent. higher than last year and these advanced values are accounted for by the stronger Southern demand for Queensland eggs. In the second half of August, over three-quarters of a million eggs were consigned to Southern markets. Further large shipments followed. The local demand was heavy and comparatively few were stored. A preliminary estimate of the cost of oversea export has been made and the deduction stresses, in the instructor's opinion, the unwisdom of shipping to England at present prices. The charges work out at 15s. 6d. per case, or 7½d. per dozen, and this, added to present local prices of 1s. 1½d. per dozen, means that eggs, to make good, would require to be sold at not less than 1s. 9d., and this price would not quite cover insurance and breakages in transit. There is no indication at present of opening a dressed poultry trade with London. Apart from shipping difficulties, there is to-day no Queensland surplus available for export. The existing supply cannot square with the local demand, and first-grade poultry is worth as much in Brisbane as in London without allowing for freight and other charges. Fully 80 per cent. of Queensland fowls are of the Leghorn breed, which does not produce a bird favoured at Smithfield. The one great drawback to the industry is the continued high cost of wheat and mill offals. Some of the wheat which has come under official notice is quite unsuitable for fowl feed. It is suggested that wheat should be released when it is sound and wholesome and not kept in the dumps until it has become almost useless, for poultry, to do well, must have the best of food.

Concerted Action and Compulsory Powers—A New Zealand View.

"Under united control we shall have reduced freights, reduced handling charges, reduced insurance costs, regulation of shipments, organisation of sale in England, and a complete system of advertising our produce in Home markets. Control of our produce is absolutely essential to success." Mr. E. Newman, a member of the New Zealand Parliament, thusly expressed himself ("Dominion," 16-9-22) at a meeting

of farmers in New Zealand recently. Continuing, the speaker advocated the establishment of one board with subsidiary boards for meat, wool, and butter, with power to bring all producers into line. Such a scheme would be absolutely useless without unanimity, and unanimity would be impossible without compulsory powers. There were always some people who liked to gain advantage over their neighbours, and that must not be permitted. He could not understand opposition to compulsion. Such a board would be appointed by the producers and would have no aim or object except to protect and promote the best interests of the producers. The New Zealand farmers' choice rested between compulsory control by means of a producers' board or working for the benefit of the shipping combine for the rest of their lives. One of the good results of the war was that it brought all shipping contracts to an end at the same time, so rendering combined action by producers now possible. Probably, that was the first thing the shipping combine would try to alter, an effort that producers must resist and fight to a finish. In that, wool, meat, and dairy producers must act together.

Co-operation in California.

Co-operators in the fruit business turn naturally to California for examples of success in producers' combination, for there, to-day, and in America generally, agricultural co-operation has come to be accepted as a precept of progress. In deciduous crops, Californian orchardists have made a co-operative start with the citrus crop and, after many ups and downs, due to lack of solidarity among growers and the big fight put up by the middlemen, the movement was eventually consolidated, and has done more than anything else to stabilise prices and guarantee the producer a remunerative return for his fruit. Peach and apricot growers, raisin and fig growers, prune and olive growers have all been working along similar lines in recent years, but the deciduous fruits are so much more difficult to handle than the citrus that anything like a "get-together" movement among all the sections was for long declared to be impossible, yet by the latest mails from San Francisco we have received advices which demonstrate the fact that nothing is impossible to any body of producers who, under efficient leadership, set their minds on building up their industry by honest methods.

By careful organisation, the deciduous orchardists have formed what is virtually a combine, which hopes to control production, shipments, and prices by keeping as much as possible of the traffic out of the hands of the middleman, and, in the end, dealing directly with the consumer wherever possible. This, it is believed, will result in lower prices for peaches, apricots, cherries, pears, apples and other deciduous fruits, as it has resulted in the past in more reasonable cost to the consumer of oranges, lemons, and grape fruit.

The price of peaches has been fixed on a basis of present production costs, and present supply and demand, at about £12 a ton for No. 1 cling peaches; £6 a ton for No. 2 clings; £9 a ton for Lowell freestones, and £8 a ton for all other freestones. This price, the producers hold, will bring them a profit, while lowering the cost to the consumer, and, at the same time, guarantee disposal of the production to all the growers.

The Peach Growers' Association was organised only last December, and now represents about 62 per cent. of the annual peach crop of California, valued at these prices at £2,500,000 for 1922. Prices of peaches have varied from £22 a ton in 1920 to £7 last year, and the California Canning Peach Growers organised to put a stop to such fluctuations in price and to speculation in the fruit by middlemen, thereby robbing the consumer, and preventing the producer from getting a fair price. To do this, it was held necessary to provide a standardised price each year for the crop, which is reported as normal this year.

The prune crop, probably, will be the best and largest of all the deciduous fruit crops in California this year, according to the director of the California Prune and Apricot Growers' Association, which has been at work for many months endeavouring to standardise production, shipments, distribution, and prices, so that both producer and consumer may get a "square deal" on the crops with which it deals.

There is one vital point behind this great forward movement that needs to be stressed at the moment in Australia, and in Queensland particularly, and that is that its present progress was only made possible by the growers "signing up." Instead of talking volubly and vehemently about loyalty, rights, principles, and other more or less vague abstractions, the Californian growers have signed contracts to sell only through their own co-operative concerns, whatever the price, for a period of five years. Until the majority saw the wisdom of sticking together in this way, little progress was made, as the middleman was able to get in and play one off against another. When we are prepared to profit by the experiences of other and older countries, who have overcome disabilities and difficulties similar to those with which we are confronted to-day, the establishment of a sane selling system will surely follow.

Standardised Canned Products—The British Market.

Major E. A. Belcher, leader of the British Empire Exhibition delegation, speaking at Melbourne recently, advocated a more extensive and scientific advertising of Australian goods in Britain. He said that he believed that there was just as big a future for Australian canned and dried fruits in Britain as for Australian manufactured goods. Dealing with the question of unattractive packing and labelling of Australian goods, he said that California had forgotten more than Australia had begun to learn about the marketing of canned fruits, although the quality of the Australian article was equal, if not superior, to the Californian. He warned Australian meat exporters against competition from Uruguay in the future. Before long, Uruguay would be as formidable a rival as the Argentine. Australia should try and increase her output tenfold in the next few years. In fruit, if we could produce a definitely standardised article equal to what he had recently tasted, and could retain sufficient control over its export to prevent a bad article being exported, there was no limit to the amount Great Britain and Europe could absorb. Even at the cost of Government supervision, it was better to have some standardisation and have nothing but the best stuff going out of Australia.

Co-operation and Common Honesty.

The present season marks the turning-point for fruitgrowers, says California's Professor of Rural Institutions, who further declares that the growers should more than ever attempt to produce fruit to please the consumer, which, of course, places emphasis on quality production. He thinks that with the aid of co-operative marketing the growers will be able to secure a reasonable price for all fruit of the better grades, but questions whether, under any circumstances, they can secure a satisfactory profit from inferior grades. The influence of the "buyer's market," he believes, will be sure to make itself felt; and the producer of poor fruit will be the one to suffer.

In Australia, the same thing is becoming more and more evident. The public want plenty of fruit, but they are so often "taken down" by receiving inferior stuff that many of them refrain from buying more than a minimum. The retailer is sometimes to blame for this state of affairs, but just as often it is the grower who is at fault. He continues to grow and to send to the market fruit that is much below the standard set by consumers. When co-operation comes, in addition to getting better and more regular prices for the producer of good fruit, it will, undoubtedly, force the careless grower to improve his methods or to get out of the business. True co-operation is only for the honest farmer.

Dehydration.

The question of suitable and economical methods of artificially drying various fruits, vegetables, and maize is one that has for some time engaged the attention of the Minister for Agriculture (Hon. W. N. Gillies). It will be remembered that, last year, Mr. Quodling, the Director of Agriculture, went South to consult with the firm of Metcalfe and Sons, who designed and built the grain elevators for the New South Wales Government. This firm subsequently submitted plans and estimate of a comprehensive cleaning, drying, and storage scheme for maize in the Atherton District which is the largest maize-growing district in the State. The matter was fully considered at the time, but the estimate (£170,000 sterling) was considered prohibitive. Mr. Gillies took the opportunity recently of discussing this matter personally with Mr. Carter, the engineer to Messrs. Metcalfe and Sons. Mr. Gillies believes now that a less expensive scheme than the original one submitted would meet present requirements, and in view of the suggested Maize Pool, proper storage facilities will, in his opinion, be necessary, not only in the North, but at Kingaroy and other centres, and to this end further investigations are being made. On the subject of dehydration of fruits, which has made such rapid strides in California, Mr. Gillies, in the course of a recent Press interview, referred to an article in Bulletin No. 337, published by the University of California, entitled "Some Factors of Dehydrator Efficiency." This article was written by W. V. Cruess and A. W. Christie. The writers point out that in the course of the past two years more than 150 dehydrators have been built in California. There are also in existence not less than 150 driers of less modern design built before 1919. Some of these were erected merely as an insurance against rain damage, but many have been used in place of sun-drying, as in prune and apple drying. Many different types are represented and several different systems of heat production and heat conveyance are employed. Observations have been made upon many of these plants. In several cases, direct comparisons of important types were possible. Because of the improvements that are rapidly being made in the design, construction, and operation of dehydrators, this publication must be considered in the nature of a progress report. It is issued in the hope that the results, which in many instances are sufficiently conclusive, will be of value to operators and prospective purchasers or builders of dehydrators. Tables are furnished showing

the first cost of a number of different types of plants and the working cost of same, and it would appear from the estimates given that the actual cost per green pound of fruit runs from one-third of a penny to twopence; this, however, is for a short season of about two months. In the summary and conclusions, the writers point out that a completely equipped and satisfactory dehydrator can be built for \$500 (£100) or less per green ton capacity per twenty-four hours. They also say that the air-blast tunnel type of dehydrator is the most economical to operate in regard to both fixed charges and operative costs.

Co-operation amongst Poultrymen.

In a back street of Brisbane a little co-operative trading concern has taken root and gives every promise of developing into a strong and healthy growth. This co-operative effort has been launched by the N.U.P.B.A. Co-operative Society Limited which, in its turn, is an offshoot of the Queensland Branch of the National Utility Poultry Breeders' Association of Australia. There are many poultry clubs and societies in Queensland which exist solely for the show bench, but as far as is known the particular association referred to is the only one which has for its object the development and advancement, from the commercial standpoint, of the poultry business. For many years the Association has been steadily at work educating its members by lectures, demonstrations, and other practical means. The co-operative society was formed some little time ago and is already showing marked virility. Its object is to supply the wants of the poultry farmer and to handle his products to the best possible advantage. This year the society is making an effort to grapple with the surplus egg question and is now busily engaged preparing eggs for export. Large orders have been placed for the special cases and material required for the packing of the eggs for overseas carriage, and scrupulous care has been taken to ensure the eggs arriving in a condition which will do credit, not only to the society, but to the State. Size and quality have been taken into account and only the very best are allowed to be shipped. Each case is clearly marked "Produce of Queensland," and it is confidently hoped and believed that this experiment will make a distinctly favourable impression when the consignment is opened up in England. The first shipment was made recently, and this will be followed by others at regular intervals while the season of glut lasts. It is hoped, by this means, to gradually improve the position of the egg farmer, and that there is ample opportunity for improvement there is not the least doubt. With new laid eggs at 1s. per dozen, less commission, cases, railage, and other charges, the poultry farmer may well ask where is his basic wage coming from. Probably, there is no business which provides so many failures as does poultry farming, and there is no doubt that the poor returns for the labour and care involved are mainly responsible for this; and until the poultry farmer learns the stern lesson of organising, there can be little improvement. On every hand the advantages of successful organisation are apparent. It is not hard to remember when the dairy farmer had to be satisfied with 9d. per lb. or less for butter, and when the wheatgrower had to accept a price which would hardly pay working expenses in a bountiful season. The experience was bitter, but its teachings have not been in vain, and surely the egg-man is wise enough to see wherein his salvation lies. The bitter experience has been his for long enough, and now is his opportunity to make the move. The N.U.P.B.A. Society has stepped into the breach and is making an attempt to bring about the desired change. Its ideals are of the highest, and its success of national importance. Queensland is admirably adapted for poultry farming, and there is no reason why the industry should not grow to be one of the greatest in the land.

The Queensland Producers' Association.

Already over 5,000 farmers have been enrolled in 250 local producers' associations and these numbers are being added to largely every week. The advantages of a State-wide scheme of organisation, backed by statute, are so obvious and the powers that are now placed in the hands of the producer so wide, that it is difficult to imagine a reason why any farmer should remain outside the association. According to the Act governing the Queensland Producers' Association, the present Provisional Council must be superseded on 25th March next by a Council elected by district councils representing the local producers' associations. It is very important that every rural centre should have a voice in the election of councillors, because all primary producers will be subject to the provisions of the Act. The dates fixed for the completion of various stages of the elections are:—Nomination of candidates, 6th January; election of district councils, 3rd February; declaration of results, 17th February; first meetings of district councils, 3rd March. Full particulars are posted at all country railway stations.

Acknowledgment.

For the photographs of prize-winning cattle reproduced in this issue, we are indebted to the "Live Stock Bulletin."

General Notes.

QUEENSLAND COTTON PRODUCTION.

TABLE SHOWING THE AREA, PRODUCTION, AND EXPORT OF COTTON FROM
QUEENSLAND FROM 1860-1921.

Year.			Area.	Produce.	Exports.	
			Acres.	Lb.	Lb.	£
1860	..	..	14	Not collected.	..	..
1861	..	..	395	"	2 bags	4
1862	..	..	392	"	14,344	1,423
1863	..	..	2,021	"	31,557	3,056
1864	..	..	479	"	38,730	4,186
1865	..	..	478	"	145,820	12,197
1866	..	..	2,884	"	{ 196,704	19,218
1867	..	..	8,149	"	{ 10,568*	400
1868	..	..	11,454	"	412,941	26,631
1869	..	..	14,427	"	1,809,628	68,929
1870	..	..	14,674	"	1,118,899	51,217
1871	..	..	12,963	"	1,630,755	73,437
1872	..	..	12,002	"	2,567,318	78,209
1873	..	..	9,663	"	1,486,987	59,774
1874	..	..	4,149	"	1,375,216	48,673
1875	..	..	1,674	"	979,875	32,819
1876	..	..	573	"	314,454	8,162
1877	..	..	276	90,450	137,812	3,541
1878	..	..	37	10,500	221,689	6,940
1879	..	..	105	30,423	43,532	1,216
1880	..	..	619	125,736	26,261	664
1881	..	..	973	183,488	108,260	3,581
1882	..	..	1,082	243,232	266,289	8,839
1883	..	..	316	70,020	248,029	7,932
1884	..	..	49	12,050	80,689	3,430
1885	..	..	50	14,968	28,856	1,066
1886	..	..	15	2,100	19,241	608
1887	..	..	..	..	1,548	45
1888	..	..	..	..	..	..
1889	..	..	1	7	..	..
1890	..	..	16	5,315	..	..
1891	..	..	90	48,746	15,396	488
1892	..	..	717	212,370	38,618	1,061
1893	..	..	191	29,353	88,559	1,921
1894	..	..	100	54,801†	1,426	56
1895	..	..	494	269,110	3,860	105
1896	..	..	280	141,032	..	..
1897	..	..	48	19,977	..	..
1898	..	..	1	50	..	..
1899	..	..	..	..	..	..
1900	..	..	..	..	..	..
1901	..	..	..	..	..	..
1902	..	..	8	1,600	..	..
1903	..	..	2	1,500	..	..
1904	..	..	30	25,832	..	..
1905	..	..	171	113,008	..	..
1906	..	..	138	77,381	20,450	583
1907	..	..	300	109,294	71,053	1,259
1908	..	..	540	117,521	15,561	440
1909	..	..	509	129,245	11,832	457
1910	..	..	460	151,438	10,531	655
1911	..	..	605	186,894	2,267‡	141

QUEENSLAND COTTON PRODUCTION—*continued.*

TABLE SHOWING THE AREA, PRODUCTION, AND EXPORT OF COTTON FROM QUEENSLAND FROM 1860-1921—*continued.*

Year.			Area.	Produce.	Exports.	
			Acres.	Lb.	Lb.	£
1912	..	..	441	150,414	12,880	650
1913	..	..	214	35,230	82,734	2,147
1914	..	..	134	20,336	7,583§	372
1915	..	..	72	12,238	..	..
1916	..	..	75	24,264	5,217	196
1917	..	..	133	118,229	..	..
1918	..	..	203	166,458	..	..
1919	..	..	72	37,238	406	7
1920	..	..	166	57,065	..	..
1921	..	..	1,944	940,126	..	..
			858	Unproductive	..	..

* Unginned.

† Previously recorded as ginned; now unginned.

‡ The collection of Interstate transfers was discontinued by the Customs authorities in September, 1910.

§ Six months. From 1914 the export figures are for the year ending 30th June.



PLATE 78.—FIFTEEN-MONTHS-OLD BADILA CANE, CUTTING PROBABLY AT THE RATE OF FIFTY-FIVE TONS PER ACRE, GROWN ON MR. W. TOATES'S FARM, N.Q., ON A SMALL PATCH OF NEW SCRUB LAND.

Answers to Correspondents.

Paralysis in Young Pigs.

D.B. (Toogoolawah)—

Your pigs are evidently suffering with paralysis, which may be brought on by several causes:—viz., rheumatism, worms in the kidneys and surrounding parts, or by overfeeding young pigs on an exclusive diet of corn and water.

Treatment ("Pig Raising in Queensland," E. Graham and H. C. Quodling, p. 46):—If due to rheumatism, see that the pigs are housed at night in a dry place, and allowed to sleep on wood flooring instead of on concrete or earth. Give daily, salicylate of soda 15 to 30 grains, and bicarbonate of potash 1 to 2 drachms, in the food or as a drench.

If due to worms, give, in the food or as a drench: One teaspoonful of oil of turpentine, 20 drops of liquid perchloride of iron, and three (3) or four (4) oz. of raw linseed oil. This is sufficient for 50 lb. body weight. It should be given after the animal has been fasting for some hours, and can be repeated several times, with an interval of three or four days.

When due to feeding, as mentioned above, stop the corn, and give once daily in a mixed diet, or in milk, 1 dessertspoonful of the following powder for every 100 lb. body weight, after it has been well mixed and powdered:—Sulphur, 2 oz.; sodium bicarbonate, 4 oz.; sodium sulphate, 2 oz.; black antimony, 2 oz.; sulphate of iron, 1 oz.; wood charcoal, 2 oz.

Lice on Pigs.

"TINGOORA"—

Pigs are often troubled with a species of louse commonly known as the pig-louse (*Haematopinus suis*). This species is an active blood-sucker, and is among the largest of lice, measuring one-fifth inch in length. It is a flat, oval insect, with a long, narrow head, and its legs end in long claws, which enable it to move rapidly among the bristles of the pig. The pig-louse spends its entire life on the body of the host, and attaches its eggs or "nits" to the bristles. While it may occur on all parts of the body, the favourite spots are within the ears, behind and in front of the ears, on the breast, and in the armpits.

For the destruction of these parasites, dipping, spraying, or hand-dressing may be resorted to. Dipping is usually more convenient in the case of young pigs, and spraying for adult ones. Various substances may be used as dips or sprays. Smythe recommends Jeyes' fluid, diluted 1.60 with water. Other substances are creoline (5 per cent. solution), and nicotine extracts, diluted according to the directions of the manufacturers. Treatment should be repeated after about a week, in order to destroy lice that may hatch out from remaining eggs. The sleeping quarters of pigs should be thoroughly cleaned and disinfected at the same time as dipping or spraying takes place. For hand-dressing, the parts infected with nits and lice may be rubbed with a cloth soaked in paraffin or a mixture of paraffin and linseed oil (1:1). An ointment prepared by thoroughly mixing equal quantities of paraffin, sulphur, and lard is also effective.

If the pigs are running in enclosed camps a little crude oil, sufficient to form a thin layer on top of the water, may be poured into the wallow about every ten days. American pig farmers find this a useful method of checking lice on pigs. Another method is to tie a sack or other coarse cloth around a post at a proper height, so that the pigs may rub against it; the sack is periodically saturated with crude oil.

Green Cane Top Silage.

H.W. (Mackay)—

The Director of Sugar Experiment Stations (Mr. H. T. Easterby) advises as follows:—

Experiments in this direction were carried out by the Bureau at the Sugar Experiment Station, Bundaberg, and this silage is now made there every year. The feeding value is low, as will be shown by the following analyses supplied by the Agricultural Chemist, Mr. J. C. Brünnich. It is an assistance during dry weather, mixed with other foodstuffs:—

Sugar-cane Tops Ensilage.

	Per cent.
Moisture	78.09
Dry matter	21.91
Crude protein	1.34
True protein	0.66
Ash	2.72
Crude fibre	8.87
Crude fat	0.79
Carbohydrates (etc.) by diff.	8.19
Total nitrogen	0.214
Proteid nitrogen	0.105
Amido nitrogen	0.075
Ammonia	0.034
Acidity as lactic acid	1.73

The food value of this ensilage is extremely low as compared with corn silage, or Soudan grass silage, &c., on account of the low protein contents.

Nitrogenous concentrated foodstuffs will have to be used in combination in order to get complete rations for stock.

Marketing Intelligence.

W.L. (Ambrose)—

A system of supplying complete and authentic market information direct to Local Producers' Associations at least once a week is now being devised by the Council of Agriculture. Obviously, a Journal published only once a month is of no great value as a vehicle for marketing intelligence. Timeliness and *absolute accuracy* are, of course, essential in market reports.

Tree Lucerne.

J.H.Ry. (Pittsworth)—

Tree lucerne seed may be obtained from most seedsmen. The retail price is about 1s. per oz. Seed should be soaked in water before sowing, either in boxes or in the permanent position. It is of fairly rapid growth, reaching 10 or 12 feet in the course of about three years, and bears a profusion of white pea-shaped flowers, useful where bees are kept. It stands frost and should do well on the Downs. As a fodder it is an "also ran" compared with lucerne proper, which is easily the king of fodders on the Downs.

Lime-Sulphur Wash.

"OLD SUBSCRIBER" (Edmonton)—

A concentrated solution of lime and sulphur is now manufactured in quantity, and is sold reasonably and of special strength. It is considered generally more satisfactory for orchardists to buy the concentrated mixture and dilute it to their own requirements than to go to the trouble (and it is a disagreeable job!) of making it themselves. See "Citrus Culture" (A. H. Benson) 7th Edition, p. 69, a copy of which is being posted direct.

To Soften Hides.

W.C.B. (Wondai)—

There is no special process for softening untanned hides. The usual tannery practice is to soak them in water for, say, twenty-four hours.

Coffee Berries.

“YARWUN” (Yarwun)—

We do not know of any rapid process of removing the thin inner skin attached to coffee berries. When dry, this thin skin is not detrimental to the berry as far as roasting is concerned.

Notice of Scrub Burns.

“FARMER” (Mount Larcom)—

It is necessary to notify your neighbours as to your intention to fire your falling and advise them of the date upon which you have decided to burn. You would naturally exercise the greatest possible care in keeping the fire within bounds. You would certainly be responsible for any damage to neighbours' property arising out of the careless use of fire and neglect to give reasonable notice and to take all reasonable precautions to prevent a fire spreading.

Operations of Rural Banks and Credit Systems.

T.F. (Boonah)—

A series of articles on rural banking systems and co-operative credit associations are now in course of preparation for publication in the Journal.

Cassaba Melon Seeds.

We are very grateful to the subscribers who so generously responded to our request for new seeds for this season's sowing. Their kindness and courtesy have enabled us to meet all requests on our list. •

Cotton Photograph.

F.A. (Hut Creek, Ambrose)—

The photograph of your cotton field was not sharp enough, and was therefore quite unsuitable for reproduction. Sorry. When next you take a picture send us the negative, from which we shall be able to take a print up to our requirements. Thanks.

Farm and Garden Notes for November.

FIELD.—The recent unfavourable weather experienced throughout the wheat areas must naturally affect the ultimate yields. Areas in many parts of the Maranoa are already beyond rain redemption. Harvesting on the Downs may be expected to commence in the latter part of October; but, unfortunately, it is not likely to extend over any lengthy period. Growers who have suffered a seasonal setback would be well advised to push on with recultivation for the purpose of making a saver out of cotton. From mid-October until the beginning of November is the cotton planting season, and delay in districts usually subject to early frosts means a risk of failure to secure a cotton rake-off.

Farmers are commencing to realise that quick-maturing wheats which possess a degree of rust resistance are more dependable than the slow-growing and often rust-susceptible kinds, which are gradually giving place to these and mid-season varieties.

Growers are advised to make every preparation to work up the surface of the ground immediately after the removal of their crops, so that the soil may be put into good condition to receive any rain which falls, the conservation of which is the best guarantee for the success of the next succeeding crop. Such initial preparation also encourages the early growth of all foreign and weed seeds, and permits of their eradication by the implements used to produce the desired soil mulch. In such manner paddocks are kept clean and the purity of crops is maintained. The careful preparation of areas intended for maize-planting cannot be too strongly impressed upon growers. Deep and thorough ploughing, followed by cross-ploughing and subsequent cultivation of the soil, must precede sowing if success would be attained; and all efforts must be concentrated to obtain a good surface mulch. Failure to follow up the subsequent sowings by harrowing prior to the appearance of the young plant conduces to weed growths and very often entails, by neglect of this operation, subsequent hand-hoeing between the plants in the drills. Harrowing should be discontinued before the plant breaks through the surface, otherwise damage will accrue to the tender shoots of the young plant. When the young maize plant has hardened up it may, with advantage, be lightly harrowed in the direction of the drills, but such practice must discontinue once the plant has attained a height of 6 inches. Close cultivation by inter-row cultivation implements is necessary after every shower to conserve moisture and to prevent weed growth, care being taken to ensure each cultivation being shallower than the preceding one, and so prevent damage to the root system of the plant, which is extensive. Inter-row cultivation should cease with the advent of the cob on the plant; and, if proper attention has been given to the crop, it should, at this period, be unnecessary. Where crops are planted on the check-row principle, inter-row cultivation is facilitated, and more even crops result.

The French millets (red and white), owing to their rapid maturing qualities, form excellent intermediate or supplementary crops, and are suitable for present sowing. Their value for fodder and seed purposes is worthy of more general recognition at the hands of the average farmer.

Past dry periods have impressed upon us the necessity of providing during good seasons against the return of less favourable ones, and in this connection the cultivation of quick-growing fodder plants appeals to us. Many varieties of useful classes of fodder can be cultivated over a large portion of this State; chief of which, perhaps, are the sorghum family for grain and fodder purposes. Of the latter, Sudan grass has much to commend it, and is fast becoming one of the most favoured by stockowners. Grain sorghums, of which Feterita, Red Kafir, and the various Milos are examples, should occupy a more prominent position for purposes of horse and pig feeding, and are particularly suited to those localities which are unsuitable for maize production. Some varieties of sorghum have strong frost-resisting qualities, and lend themselves to those localities where provision for some form of succulent fodder is necessary during the winter months.

Orchard Notes for November.

THE COASTAL DISTRICTS.

November is somewhat of a slack month for fruit in the coastal districts, as the citrus crop, excepting a few Valencia Late oranges, off-season lemons, and a few limes, is over. Pineapples are also scarce, as the late spring crop is finished, and there are only comparatively few off-season fruits ripening. The main summer crop of fruit in the principal producing districts is only in the flowering stage, though that in the more tropical parts is ready for marketing. It is also a slack month for bananas, as the summer fruit is not yet fully developed, and the bunches that make their appearance are usually poor. They have been slow in developing on account of the comparatively cool weather of winter and early spring, when the suckers were more or less at a standstill. Young suckers should, however, be making vigorous growth now, and the plantation will require constant attention to prevent the stools being overcrowded with too many suckers. Keep the land well worked and free from weeds of all kinds, as good growth now means good bunches in the autumn and early winter. Where there is a danger of the soil washing badly with heavy rain, rows of Mauritius, velvet, or other suitable beans should be planted at right angles to the fall of the land, as the growth they make will tend to hold the soil and thus save any from being washed away. When planting beans of any kind, either to prevent washing or for green manuring, don't forget to manure them, as thereby you will get a much greater yield, and as none of the manure is removed from the soil, as the crop is allowed to lie and rot on the ground, it is all made use of eventually by the permanent crop.

A good all-round manure for a bean crop is a mixture of 1 cwt. of sulphate of potash and 4 cwt. of basic superphosphate or finely-ground phosphatic rock to the acre, and, if the soil is deficient in lime, a dressing of not less than half a ton to the acre will be found very beneficial, as all leguminous plants require lime to yield their maximum return both of haulm and pulse. The pineapple plantations require to be kept in a state of thorough tilth, and no weeds must on any account be allowed to grow. If blady grass makes its appearance it must be stamped out, as once it gets established in the rows it is only a short time before it takes control, and the plantation is ruined, so that it can only be brought back into profit by taking out the pines, killing the blady grass, and, after thoroughly and deeply working the land, manuring it and replanting.

The planting of pineapples and bananas can be continued throughout the month, taking care to see that the land is properly prepared and that the advice given in previous monthly notes is followed. Young pawpaw plants that have been raised in the seed bed can be set out now, as also can young passion fruit. Citrus orchards require to be well looked after; the ground must be kept in a state of thorough tilth, and if the trees show the slightest sign of distress, owing to lack of moisture in the soil, they must be given a thorough irrigation if water is available for this purpose. The trees should be carefully examined from time to time so as to note when young scale insects of any kind are hatching out, and when this is noted they should be sprayed with a weak emulsion of a miscible oil consisting of one part of oil in forty parts of emulsion, as this is quite strong enough to kill any young scales before they develop their protective covering. As stated in these notes previously, no oil sprays should be used when the trees are suffering from lack of moisture, as

they are then likely to do more damage than good to citrus trees. If scale insects are very bad, and it is important that the trees are sprayed, a weak lime-sulphur spray, or even a soap and tobacco or weak resin wash, will kill the young scales as they hatch out. In the earlier districts a keen lookout must be kept for the first appearance of the mites, which are the direct cause of the darkening of the skin of the fruit known as "Maori." The first indication of the trouble is that when the sun is shining on the young fruit, it appears to be covered with a grey dust, and if the fruit is examined with a good lens it will be seen to be covered with large numbers of small yellowish slug-like insects which are living on the skin. Spraying with sodium or potassium sulphide washes, as recommended by the Department, or with a weak solution of lime sulphur, will destroy these insects and prevent the fruit from turning black. Borers of all kinds should be looked for and destroyed wherever found. Water sprouts, if not already removed, should be cut away. Vines will require careful attention, and the vineyard should be kept in a state of thorough cultivation. Spraying for Downy mildew and black spot should be continued, if necessary, as well as sulphuring to prevent oidium.

Fruit fly must be systematically fought whenever seen, and special care must be taken to gather and destroy any early ripening peaches or other fruits that may be infested. If this is done systematically by all growers, as provided by the Diseases in Plants Act, there will be many less flies to attack the later crops of mangoes and other fruits.

Leaf-eating insects of all kinds should be systematically fought wherever seen, by spraying with arsenate of lead, and potatoes and tomatoes should be sprayed with a combined spray consisting of Bordeaux or Burgundy mixture and arsenate of lead, so that diseases such as early blight and Irish blight may be prevented and leaf-eating insects, which frequently cause very heavy losses to these crops, be destroyed.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Keep the orchards and vineyards in a thorough state of cultivation, so as to keep down all weed growth and conserve moisture in the soil. This is important, as, if a long spell of dry weather sets in, the crop of summer fruit will suffer severely from the lack of moisture. Citrus trees should be irrigated where necessary, and the land kept in a state of perfect tilth. Spraying for codlin moth should be continued, and all pip fruit trees must be bandaged the beginning of the month; further, the bandages must be examined at frequent intervals and all larvæ contained in them destroyed. The neglect to spray thoroughly and to attend to the bandages properly is responsible for the increase in this serious pest in the Granite Belt, and growers are warned that they must pay more attention to the destruction of this pest if they wish to grow pip fruits profitably. Fruit fly may make its appearance in the cherry crop; if so, every effort should be made to stamp out the infestation at once, as, unless this is done, and if the fly is allowed to breed unchecked, the later ripening crops of plums, peaches, apples, pears, apricots, and Japanese plums are bound to become more or less badly infested. Combined action must be taken to combat this, the most serious pest of the Granite Belt, and growers must realise that, unless they take this action and see that careless growers do not breed the fly wholesale, they will never keep it in check, and it will always be a very heavy tax on their industry. Rutherglen bug is another serious pest in this district, and is propagated by the million by careless orchardists. The best remedy for this pest is to keep the orchard clean and free from weeds. Brown rot in fruit should be watched for carefully and, on its first appearance in a district, all ripening fruits should be sprayed with the sodium sulphide wash.

All kinds of leaf-eating insects should be kept in check by spraying with arsenate of lead, and all grape vines, potatoes, and tomatoes should be kept sprayed with Bordeaux or Burgundy mixture, the former for black spot and downy mildew, and the latter for early and late (Irish) blight.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1922.	O. TOBER.		NOVEMBER.		DECEMBER	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5:34	5:50	5:4	6:8	4:50	6:32
2	5:33	5:51	5:3	6:9	4:50	6:33
3	5:32	5:52	5:3	6:9	4:50	6:34
4	5:31	5:52	5:2	6:10	4:50	6:35
5	5:29	5:53	5:1	6:11	4:50	6:36
6	5:28	5:53	5:0	6:12	4:51	6:36
7	5:27	5:54	5:0	6:12	4:51	6:37
8	5:25	5:54	4:59	6:13	4:51	6:38
9	5:24	5:55	4:59	6:14	4:51	6:38
10	5:23	5:55	4:58	6:15	4:51	6:39
11	5:22	5:56	4:57	6:16	4:52	6:39
12	5:21	5:56	4:57	6:16	4:52	6:40
13	5:20	5:57	4:56	6:17	4:52	6:40
14	5:19	5:57	4:56	6:18	4:52	6:41
15	5:18	5:58	4:55	6:19	4:53	6:41
16	5:17	5:59	4:55	6:20	4:53	6:42
17	5:16	5:59	4:54	6:20	4:53	6:43
18	5:15	6:0	4:54	6:21	4:54	6:44
19	5:14	6:0	4:53	6:22	4:54	6:45
20	5:13	6:1	4:53	6:23	4:55	6:45
21	5:12	6:2	4:53	6:24	4:55	6:46
22	5:11	6:2	4:52	6:24	4:56	6:46
23	5:10	6:3	4:52	6:25	4:56	6:46
24	5:9	6:3	4:51	6:26	4:57	6:47
25	5:8	6:4	4:51	6:27	4:57	6:47
26	5:8	6:5	4:51	6:28	4:58	6:47
27	5:7	6:6	4:50	6:28	4:59	6:48
28	5:6	6:6	4:50	6:29	5:0	6:48
29	5:5	6:7	4:50	6:30	5:0	6:49
30	5:5	6:7	4:50	6:31	5:1	6:49
31	5:4	6:8	...	...	5:1	6:49

PHASES OF THE MOON, OCCULTATIONS, &c

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer" Time is not used.

6 Oct.	○ Full Moon	10 58 a.m.
14 "	☾ Last Quarter	7 55 a.m.
20 "	☉ New Moon	11 40 p.m.
27 "	☾ First Quarter	11 26 p.m.

Apogee on 5th at 6 a.m.

Perigee on 20th at 2.42 a.m.

An occultation of Delta Tauri will take place on 10th October about a quarter past 9. With binoculars or a small telescope this will be an interesting sight as the Moon will be in the group of stars called the Hyades, of which Aldebaran is the principal star.

5 Nov.	○ Full Moon	4 36 a.m.
12 "	☾ Last Quarter	5 52 p.m.
19 "	☉ New Moon	10 6 a.m.
26 "	☾ First Quarter	6 15 p.m.

Perigee on the 17th at 10.6 a.m.

Apogee on the 29th at 5.24 a.m.

Delta Tauri will again be occulted about 3 a.m. on the 7th; also Eta Virginis on the 15th about 9.30 p.m.; and the planet Saturn on the 16th about 5 p.m. when the Moon and it are far below the horizon.

4 Dec.	○ Full Moon	9 24 p.m.
12 "	☾ Last Quarter	2 41 a.m.
18 "	☉ New Moon	10 20 p.m.
26 "	☾ First Quarter	3 53 p.m.

Perigee on 15th at 1.30 a.m.

Apogee on 27th at 2.6 a.m.

Delta Tauri will be occulted about 10 a.m. on the 4th, when the Moon and star are below the horizon, but on the 31st, when it will be occulted about the time of sunset, an interesting observation of the star's reappearance may be possible in the twilight.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

QUEENSLAND AGRICULTURAL JOURNAL

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NOVEMBER, 1922.

PART 5.

ORGANISATION OF THE AGRICULTURAL INDUSTRY.

The Queensland Producers' Association.

Monthly Record of Progress and Achievement.

The last Regular Meeting of the Council of Agriculture was held in the Council Room, Teachers' Training College Building, Turbot street, Brisbane, on 19th October. Subjoined is a Record of Proceedings covering many matters of first importance to the Farming Industry.

Attendance.

In the absence of the President (Hon. W. N. Gillies), the chair was taken by the Vice-President (Mr. J. Purcell).

There were present: Messrs. J. W. Davidson, E. Graham, T. Flood Plunkett, W. Purcell, H. Keefer, F. M. Ruskin, H. I. H. Ross, W. Ranger, S. J. Howe, J. T. Tod, F. J. Morgan, T. Muir, R. Swan, T. A. Powell, W. G. Bachelor, C. H. Pritchard, C. V. Hives, the Director (L. R. Macgregor), and the Secretary (J. F. McCaffrey).

ADMINISTRATIVE COMMITTEE.

Expert Accountancy Committee.

In connection with the Expert Committee to be appointed to consider the question of a uniform accountancy system for butter and cheese factories, Mr. A. E. Neville, Standard Dairy Company (representing butter factories), Mr. Robinson (Messrs. Robinson and Jolly, Public Accountants), and Mr. H. Russell (Department of Agriculture and Stock) were appointed to act.

Farmers' Convention—General.

Draft Orders in Council covering the election of District Councils, and generally applying the provisions of the Primary Producers' Organisation Act, including the constitution of the Council of Agriculture, was deferred to the next meeting.

In regard to a proposal for holding an annual convention of farmers, it was decided that the Director be requested to prepare a definite scheme and also an estimate of the cost involved.

The Council approved of a scheme submitted by the Director to establish, under the auspices of the Council, a regular window show in Queen street for the purpose of bringing before the public successive displays of Agricultural Products. A committee was appointed to give effect to the scheme.

It was reported that, to date, 366 Local Producers' Associations had been formed, and over 7,000 primary producers have enrolled.

DAIRYING COMMITTEE.

Metropolitan Milk Supply.

It was reported that it was the desire of the Metropolitan Milk Producers' Association to evolve a more satisfactory scheme in connection with the present handling of milk, and to that end the Milk Producers' Association had sought the aid of the Council of Agriculture. Further information, following upon a meeting of Milk Producers recently held, is awaited by the Committee.

Herd Testing.

The Council approved of the recommendation by the Committee that all Local Producers' Associations, in districts where the dairying industry is carried on, be communicated with and invited to take up Herd Testing on the basis of the existing Government scheme.

Stabilisation of Prices.

It was noted that efforts are being made by the Victorian Farmers' Union to induce the few opposing factories in Victoria to come into line with the rest of the factories throughout Australia.

Recommendations.

The Council approved of the following recommendations submitted by the Dairying Committee:—

That standard seamless containers, protected by fly-proof gauze covers, be utilised to the fullest extent, and that the several co-operative butter factories be requested to undertake the distribution of standard containers to their suppliers.

That for the purpose of protecting cream whilst held on the farm, fly-proof gauze covers for cream cans be used, and factories asked to hold supplies of these for distribution to suppliers.

That the Department of Agriculture be asked to take steps with a view to expediting the preparation of plans of standard dairy buildings, pig stys, and other appurtenances.

That in the opinion of the Council, property-owners who are themselves primary producers should not be called upon to undertake the insurance (under the Workers' Compensation Act) of share farmers or their employees engaged as tenants in work pertaining to their properties.

That the Department of Agriculture be requested to take action (possibly per medium of the Dairy Produce Act of 1920) with a view to having the vacuum tanks of milking machines rendered as sanitary as possible and fitted in such a manner as to allow the pipe service and tank to be readily taken down for cleansing purposes.

That in connection with certain resolutions recently submitted, the Harrisville Local Producers' Association be advised as follows:—

That instructions have been issued to Dairy Inspectors to confine themselves, as far as possible, to suppliers of low grade cream, but complete exemption from the operations of the Dairy Produce Act is not practicable.

That provision is made in the Dairy Produce Act for the inspection of samples of cream at the factories, and should the Association so require, the Department of Agriculture will be requested to make available, at any time, the services of an inspector for that purpose.

That it is understood an attempt recently made by the Butter Manufacturers' Association to induce Britain to impose a preferential tariff on dairy and agricultural products imported from Australia was unsuccessful, and that it is considered likely that any further attempt made by the Council would also prove abortive.

That the Railway Commissioner has advised that he will do everything possible to minimise the risk of having cream contaminated in transit over the Queensland Railways.

FRUIT COMMITTEE.

Proposed Tomato Pool.

Included in the recommendations submitted for consideration by the Council, was the proposal for establishing a Tomato Pool for the Stanthorpe district, for a period extending from about the middle of January to the middle of April, 1923. Meetings of growers had been held in many local centres in connection with the proposed pool and further meetings are to take place. The recommendation was to the effect that, providing the decision of the growers is favourable, the Director, in collaboration with members of the Administrative Committee, be authorised to make application to the Department of Agriculture for the establishment of a pool. The recommendation was agreed to.

Statistics of the Industry.

For the purpose of obtaining statistical information relating to the fruit industry, the Committee submitted a draft form of returns for the year ending 30th June, 1923. Growers would be asked to furnish the following information:—

- (a) Name of fruit.
- (b) Area under cultivation.
- (c) Total amount produced for year.
- (d) Area proposed to plant for year ended 30th June, 1924.
- (e) Estimated yield.

It was proposed that the matter of returns by growers be made compulsory, and that the Council's recommendation in favour of the proposal be submitted to the Department of Agriculture. The recommendation was approved.

Handling of Fruit.

The Committee noted that from a letter received from the Under Secretary, Department of Agriculture and Stock, it is intended to introduce legislation during next session to give effect to the recommendations of the Fruit Committee respecting this matter.

General.

In connection with the proposed amended regulations under the Diseases in Plants Act, the Fruit Committee recommended the Council's adoption of proposed amendments to Regulations No. 26, No. 27, and No. 29.

The Committee recommended, as an urgent matter, the appointment of an inspector forthwith for the purpose of inspecting, not only the New South Wales orchards adjacent to the Queensland border, but also the orchards on the Queensland side immediately adjacent to New South Wales.

It was noted that the Department of Agriculture is in a position to ascertain the commercial value of by-products of fruit and vegetables, and that there is no difficulty in the manufacture of such by-products, but the question of finding markets for the by-products when manufactured being of vital importance, the Director be asked to furnish information as to the possibility of creating markets for such products.

WHEAT AND GENERAL AGRICULTURE.

Fertilisers.

The whole question of fertilisers being of the utmost importance to primary producers, the Wheat and General Agriculture Committee have gone extensively into the matter and resolved to recommend the Council to take action. It was contended that the question of fertilisers turned upon two main points—viz., alleged unsatisfactory chemical content and high cost of fertilisers. The first aspect of the matter had been raised by Mr. T. A. Powell, a member of the Council, who had stated that it was impossible for farmers to ascertain whether fertilisers supplied to them are 'true to description'. The second phase of the question—viz., that of high cost—was brought before the Council by the Woombye Local Producers' Association, who stated that, owing to the prohibitive cost of fertilisers, most of the farms are starved and underfed, and that fertilisers are an imperative necessity to pineapple growers. This

Association deprecated the action of the Commonwealth Government in allowing fertilisers to be exported from Australia while the need for dried blood in Queensland is urgent, and the fact that many foreign fertilisers not containing blood had been bought and used with very poor results. The report submitted stated that legislation is provided under the Queensland Fertilisers Acts of 1914 to 1916, embodying provisions for the protection of producers, but it was doubtful whether the provisions are being availed of to the fullest extent. As the Act applies merely to the sale of fertilisers by dealers in Queensland, there is possibility of its evasion by the importation of fertilisers from other States.

The report contained recommendations, which the Council approved, to the effect: that the Government appoint a man of ability and experience to act as inspector of fertilisers; that the Government be asked to bring about collaboration between State Governments with a view of obtaining uniform legislation covering fertilisers; that a suggestion be made to the Department of Agriculture to redraft the regulations with a view to registration and classification of country agents, canvassers, and dealers; that a lecture be prepared, illustrated by lantern slides, for deliverance by District Agents to all Local Producers' Associations covering the whole question of fertilisers.

Proposed Arrowroot Pool.

The Director reported that he had attended a meeting of arrowroot growers at Beenleigh, on the 14th October, when it was unanimously resolved by the growers present to request that a pool, in accordance with the Primary Products Pools Act, be established for the arrowroot industry. The Committee agreed with the general principles of the scheme, and the Council decided to recommend that steps be taken to establish a pool to bring about the necessary measure of control in the hope of saving the industry.

General.

The Council noted that—The question of improving the conditions of maize growers is now receiving the personal attention of the Director, and that a report thereon will be furnished to the Council at an early date.

The question of reducing the carrying capacity of railway trucks, from 6 to 4 tons, be referred to the Transport Committee for favourable consideration.

The Director is investigating the possibility of applying the principle of co-operative distribution to Agricultural Machinery, and will furnish the Council with the result of his investigations in due course.

In connection with the resolution recently submitted by the Inverlaw Local Producers' Association, urging the Council to make the destruction of prickly-pear in infested areas a Commonwealth liability, the Federal and State Governments be requested to encourage settlers in their efforts to eradicate prickly-pear by exempting from income tax money spent for that purpose by *bonâ fide* settlers.

That the Inverlaw Local Producers' Association be advised of the action taken by the Council, and informed at the same time of the experiments being conducted by scientists under the direction of the Bureau of Commerce and Industry.

In connection with the recent suggestion received from the Moffatdale Local Producers' Association, to the effect that the Council consider the advisability of erecting a storage shed in Rockhampton for facilitating the marketing of produce, the District Agent be requested to interview the secretary and furnish the Council with full particulars as to the requirements of the Association.

In view of the statements made in a letter dated 15th ultimo from the Millman Local Producers' Association regarding the damage done to crops by wallabies, the Department of Agriculture be requested to furnish full information concerning the operations of the Dingo and Marsupial Destruction Act.

The Department be requested, at the same time, to advise as to the possibility of bringing wallabies within the scope of the Act.

THE PHYSIOGRAPHY OF NORTH AUSTRALIA--III.

By DR. H. I. JENSEN, Geological Survey, Brisbane.

REVIEW OF INDIVIDUAL DISTRICTS—continued.

HODGKINSON-MAYTOWN BELT.

Physiography.—This area, commencing north of the Mareeba-Dimbulula granite mass, near the old Minnie Moxham gold mine, consists largely of very rugged and very dry country. There are few springs and no permanent waters except the perennial Mitchell River.

Slates, steeply inclined or on end, and hard felspathic greywackes, which have frequently the appearance of miarolitic trachyte and syenite, are the most plentiful rocks. They weather into rounded hillocks and steep ridges covered with a pebbly rubble which is very severe on horses' feet, giving very bad travelling. Roads in this type of country wash out badly in the wet season.

The petrography of Kingsborough and that of Maytown are almost identical, as are also the physical features, in spite of the great distance between them. The most even country in the belt are the granite areas and the larger alluvial patches.

The Hodgkinson River at and above Mulligan, and the Palmer River at and above Maytown, run in rocky gorges which contain water only in the wet season and a few months after.

Rainfall.—The average rainfall is 39.7 inches per annum at Maytown and 35.5 inches per annum at Thornborough, practically all wet-season rains.

Soils.—The soils are in general poor, though some of the slate alluvials are very fertile if only they get water enough.

Vegetation.—On the granite patches where a fair depth of soil obtains, box (*E. microtheca*), blue gums (*E. tereticornis*), and bloodwoods (*E. terminalis*) thrive. On the greywackes throughout the belt ironbark is in almost exclusive command, and becomes very monotonous to the eye. The narrow-leaved species alone was noticed in the southern portion of the belt, but at the Maytown end a lemon-scented species (*E. staigeriana*) with a more rounded leaf is very abundant as well on the white greywackes. On the alluviated flats of greywacke origin we have also *Eucalyptus alba* and *E. grandifolia*, and near permanent water pandanus and *E. papuana*.

CHILLAGOE-O.K.-PALMER BELT.

Physiography.—The scenery and vegetation of this belt is somewhat varied. The patches of Featherbed porphyry which occur, especially down the Walsh River, constitute rough, mountainous, bouldery country. The limestone areas are partly composed of well-grassed plain and partly of jagged pinnacles. The granites are very varied in chemical composition, and their scenery is accordingly varied. The greatest part of the Chillagoe granite area is an evenly eroded plain, but there are patches of hard, fine-grained, very silicious granite which resist erosion to such an extent as to survive as steep high cones whose slopes are bestrewn with huge spheroidal boulders. These hills are known as the Metal Hills, some of the earlier surveyors having mistaken this blue silicious granite for basalt or blue metal. Between the Walsh River and the Mitchell River we also have an extensive area capped with sandstone residuals, taking the form of flat-topped ranges and mesas lined with mural escarpments which are unsealeable except at a few points. These mesas and ranges are similar to Mount Mulligan. Owing to the fact that this mesa belt consists of disconnected blocks, the road from Mungana to O.K. winds through it without having to climb these ranges.

Climate.—The climate of the Chillagoe belt belongs to the semi-arid type. The average annual rainfall amounts to about 35 inches, falling in the four or five wet season months. The limestone country has but few springs, though on the whole it is better watered than the other formations, and big subartesian and well supplies are obtainable by sinking almost anywhere in the limestone. Chillagoe Creek is a permanently flowing rivulet fed by springs, but the finest stream in the peninsular part of North Queensland is undoubtedly the Mitchell River. That river, fed by springs in the coastal hills and scrub rains about Mount Molloy, is everflowing and teeming in fish.

Soils.—The alluvial and limestone soils of the belt are fairly good, but the other formation yield only poor soil. High mineralisation in the limestone formations, together with the leaching of surface soil which takes place in the heavy wet, are factors which prevent the limestones here from forming rich black loams like those of the Barkly Tableland. The limestone soils are mostly red loams in this district; they are easily tilled, and would be very productive if irrigated.

Natural Vegetation.—On the limestone country we get an abundance of calciphile trees, such as bauhinia, mimosa, corkwood, ironwood, &c., interspersed with the more

widespread species of eucalypt like *E. grandifolia*, *E. alba*, and, in damp places, *E. papuana* and *E. terminalis*. On the jagged limestone pinnacles the bottle tree, figs, and a variety of prickly bushes and vines flourish. On the granite country we have *E. grandifolia*, *E. microtheca* (box), ironwood, and *E. terminalis* (bloodwood) on the better classes of loam, while on the poorest granite soils quinine, hakea, grevillea, gardenia, *Eucalyptus setosa*, capoe (*Bombax Malabaricum*), and such like predominate, with some *E. grandifolia* interspersed. Guttapercha grows on the boulder metal hills, near Chillagoe. Pandanus, freshwater mangrove, and tea-tree are, as usual, throughout the north present in moist places irrespective of soil.

ETHERIDGE-CROYDON DISTRICT.

Physiographic.—The writer has only skimmed through this district, the geologic interest and mineral value of which justify the undivided attention of a geologist for a period of three years. It is therefore only possible to give a broad sketch and general impressions. Large areas of this district form a slightly undulating peneplain. This is the case with the granite areas. However, where metamorphic rocks predominate, rough hills and ranges are the characteristic type of scenery. That is the case on the Percy and at Gilberton.

The Newcastle Range porphyries also give rough scenery, and the later (supposed desert) sandstones yield flat-topped tablelands.

The granite and metamorphic country is badly watered. Water-boring in the granite generally yields salt water. Boring in the metamorphic country should always be carried out at or near intersections of reefs in the quadrant, which from the dip of country and reefs is best calculated to intercept the water.

Large portions of the Etheridge district are basalt-covered, especially between Fossilbrook and Einasleigh.

The basalts are very late Tertiary basalts which have flowed down river, valley, and watercourses, compelling considerable stretches of various rivers, *c.f.*, the Einasleigh and the Copperfield, to carve new valleys.

Climate.—The rainfall of the district ranges from 28 to 30 inches per annum, falling principally in January and February, and entirely in the wet season months.

Soils.—The soils are (except in the sandstone areas and limited stretches of granite slate country) of good quality. The "older granites" are of a calcic type, and yield fair soils.

Vegetation.—The forest flora of the Croydon-Etheridge granite country is more inclined to the calciphile than to the calciphobe type; this is on account of the lime-felspar content of the granite and the comparatively slight leaching of soils under the climatic and topographic conditions of these granite areas.

Thus on the "older" granites of the Etheridge we get box (*E. bicolor* and *E. microtheca*), ironwood (*Erythrophloeum*), yellow-wood, ironbark (*E. pruinosa*), gum or Moreton Bay ash (*E. grandifolia*), mimosa (*Albizia basaltica*), corkwood, and bauhinia, while on the "new granites" (of Chillagoe granite age and acid character) we have quinine, hakea, gum (*E. grandifolia* chiefly), with box, tea-tree, and ironbark on the flats. On the desert sandstone of the Newcastle Range lancewood (*Acacia doratoxylon*) is one of the characteristic timbers on the poor deep sandy soils, and yellow bloodwood (yellowjacket, *E. trachyphloia*) on the red loams, but with these occur *Eucalyptus grandifolia*, *E. melanophloia*, *E. leptophleba*, *E. setosa*, *E. latifolia*?, *E. calycogona* var. *gracilis*, *E. dichromophloia*, *E. pallidifolia*?, *E. ferruginea*?, *E. tetradonta*, *E. terminalis*, *E. miniata*, *E. Normantonensis*, *Acacia latifolia*, *A. holoserica*, *A. falcata*, quinine, hakea, and grevillea species.

On the porphyries about May Lagoon (Croydon road) the following trees were abundant:—*E. terminalis*, *E. miniata*, *E. pruinosa*, *E. melanophloia*, hakea, &c. The Etheridge basalts were typically clothed with box (*Eucalyptus microtheca* and *E. pruinosa*), whitewood (*Alstonia constricta*), orange (*Capparis Mitchellii*), yellow-wood (*Atalaya hemistauria*), and mimosa. In moist places on all formations *E. papuana*, *E. alba*, pandanus, tea-tree, pear, currajong (*Sterculia*), and freshwater mangrove, and by permanent waterholes the Leichhardt pine are strongly in evidence. As in the Territory, gardenias, careyas, grevilleas, and such bushes are very plentifully distributed; and the Nondah (*Parmarium nondah*) occurs at the Little River on porphyries and rolling downs.

In vegetation, physiography, and climate this district is very similar to the Northern Territory. There is no scrub country at all in this region, and agriculture would only be possible with irrigation, in spite of the good soils, since the climate is markedly semi-arid.

The grasses are nutritious, and as long as bush fires are checked the area constitutes good cattle country, but the grass seeds are too bad for sheep.

[CONCLUDED.]

SUGAR: FIELD REPORTS.

The Northern Field Assistant, Mr. E. H. Osborn, reports under date 12th October, 1922, as follows:—

Herbert River District.

The harvesting in this area is proceeding at a great rate, and with the large weekly crushing, the season's operations will finish earlier than anticipated. No industrial troubles have caused delay, and, in this respect, everything points to a very satisfactory season. The total quantity of cane harvested will be under the earlier estimates, as a consequence of the very dry and cold weather experienced recently. Autumn plant cane is backward, and ratoons are also very light. Young plant cane also shows the effect of the dry weather. The varieties grown on the Herbert are principally Badila and H.Q. 426 (Clark's Seedling), with lesser quantities of H.Q. 409, Black Innis, Goru, Korpi, Nanemo, Oramboo, and varieties from the Sugar Experiment Stations, such as Q. 813, E.K. 1, E.K. 28, Q. 903, Q. 1121, Tableland Badila, and D. 1135.

The largest area of the lastnamed was a 7-acre block of June plant on Mr. J. Coomba's farm at Hawkin's Creek. It is the result of seed obtained from the Bundaberg Experiment Station last year, and certainly has made a fine strike, particularly at a time when the average strike of cane has been bad. It is growing upon some medium forest land, and Mr. Coomba intends trying it upon an area that is generally grub affected. Another of the newer varieties seen is Q. 813. Mr. Blackburn, of Macknade, has a paddock of this cane, planted last May, on a medium to poor soil. It looks remarkably green and healthy and has also struck splendidly. Mr. Blackburn is now cutting a 12-acre paddock of plant cane, consisting of Badila, H. Q. 409, and Q. 813. Of these three varieties, the lastnamed is easily the best for tonnage. Although the Q. 813 has arrowed slightly, the H.Q. 409 is a mass of arrows which developed much earlier than the former. Nearby, a small patch of Volunteered Q. 813 is cutting with good results, and the ratoons from it are already looking well, despite the dry weather. Out of a variety of canes planted in a paddock by Mr. W. J. Entieknap, consisting of Q. 813, E.K. 1, E.K. 2, E.K. 28, Q. 903, H. 109, and M.Q. 1 (Mowbray Seedling), the Q. 813 is easily the best. This particular paddock is only of average forest soil quality. Tractor power on the Herbert River is becoming more popular every year. Mr. E. J. Glover, of Hawkins Creek, has just completed a paddock, which he drilled, planted, and manured in one operation at the rate of 5 acres per day with a man each on the tractor and planter. This grower also planned to give a 32-acre block its first ploughing in four and a-half days with a 4-dise plough drawn by the same tractor.

Pests and Parasites.—The rat pest has been very severe upon the river this year. The Colonial Sugar Refining Company is going to a great deal of trouble supplying poison baits to farmers, but many farmers are lax in making the best of this opportunity. As, probably, these same growers are losing heavily from the pest, it is hard to understand their attitude in not seconding the company's efforts. Grubs have also done a certain amount of damage in places, and the collection of beetles in the worst affected places is to be renewed. Borers are very prevalent, and the Sugar Bureau's entomologist intends liberating tachinid flies in the most suitable area. In this matter, the Colonial Sugar Refining Company's officials are also doing very good work upon similar lines.

Gumming Disease.—This disease is causing a certain amount of anxiety to the local growers, as this year a large and scattered area is affected by it. The cane to which it is subject is mainly Clark's Seedling (H.Q. 426), although Badila is also affected to a slighter extent. As there is a very large proportion of this H.Q. 426 cane grown upon the Herbert, the seriousness of the situation is easily understood. In view of the foregoing, very many inquiries are being made for a cane less susceptible to the disease. The practice of planting whole sticks of cane in the drills and then chopping them through with a cane knife is condemned, for through these methods it is impossible to detect either gum-affected cane or that suffering from borer attack.

Goondi, Mourilyan, and South Johnstone.

The conditions in these areas was found to be somewhat better than those on the Herbert, as 1½ inches of rain had fallen in August and a further 1.99 inches in September. The cold weather experienced further south had also made itself felt in these areas, and both the cane now being harvested and recently planted cane were affected. The tonnage to be harvested under such conditions will naturally be under the earlier estimates. The density figures are very good. A short visit was made to Cowley (Liverpool Creek) where some good cane was seen. Among the farms visited was that of Mr. J. McCutcheon, who has some 120 acres under cane. The soil is of a fairly stiff, clayey alluvial, and gives some very good yields per acre. Mr. McCutcheon ratoons deeply, uses the skeleton plough to burst up the middles, and later on follows with a heavy grubber going 12 or 14 inches deep. He also uses green manure, preferably beans. In the South Johnstone district proper, the area that looked most forward was in the neighbourhood of No. 2 branch. The ratoons cut recently looked very fair, as did also some May and June plant. A large area of this particular part of the district is now being put under the plough. The Japoon area seen was disappointing; the cane does not seem to have made much growth since early in the year; the young plant cane is also backward. A large acreage of this land has been grubbed ready for ploughing, and quite a large acreage has been planted. Rain is badly needed, both for the recently cut ratoons and the young plant.

Soldiers' Settlement.

This settlement has progressed rapidly since my last visit. Some seventy-seven settlers are delivering cane this year, of whom about forty are upon their blocks. The cane being cut is mostly standover Badila of a very good formation, and is probably the best class of cane going into the mill. The dry weather conditions have also been felt here, and the crops are backward. Horse tramlines connecting the farms with the derricks (three in number) have been laid down in central places, and harvesting is in full swing. A school has been opened in the township, and quite a number of very neat homes are to be seen upon the holdings. The block holders are a fine type of hard-working men and are determined to make good.

Banyan and Tully.

During a short visit paid to these areas, a large amount of good cane land was seen. The land ridden over was mostly a grey alluvial capable of growing heavy crops of cane. Owing to the uncertainty of being able to dispose of cane, only a few farmers have planted, but the samples seen of Badila were of a very good quality, while a few stools of M. 1900, upon Mr. Deane's farm, looked very good, too. Just now, much interest is being taken by the residents in the question of a mill for this rich district, as they recognise that, with a sugar factory in operation and a through line to Townsville, the potentialities of this splendid sugar-growing area must be recognised.

The Southern Field Assistant, Mr. J. C. Murray, reports under date 4th October, 1922, as follows:—

Beenleigh.

Renewed interest in sugar production is being taken in this district. Growers are increasing their acreages under cane, and taking a greater interest in varieties that are likely to give better c.e.s. results than those hitherto raised on Beenleigh areas. This is an important matter both for the sugar-mills and the farmers. The producers of sugar should gradually eliminate the old and more susceptible varieties to disease from their farms, and gradually work in such useful canes as E.K. 1, Q. 813, Q. 970, and Q. 1098. Such canes as D. 1135, Badila, M. 1900 Seedling, and Malagache, which are already fairly extensively planted, should be retained. The farmers here are advised to lime as much as possible on the heavier soils, also grow maize as a green manure and rotation crop for sugar-cane. They are also recommended not to cover their plants too heavily with earth, and regard early spring as the best time to plant. Farmers are also recommended to make full use of the facilities provided by the Bureau for getting soil analysed as a basis for fertilisation. A small number of progressive men with fertiliser testing plots on typical soils are always of great value to a cane district. The Beenleigh District Show was a great success this year, the cane exhibit being especially good. Much interest was also taken in the cane exhibits of the Bureau of Sugar Experiment Stations (non-competitive) and the Department of Agriculture and Stock's cotton and maize exhibits. The farmers are pleased with the interest taken by the above authorities, and would like it repeated next year.

Woongarra.

Very fair crops are being cut in the Woongarra district; in fact, much better than was originally expected after the prolonged dry spell following the Christmas rain. Most of the cane for next year's crop is in good condition, the young ratoons and plant cane making a good showing. Varieties looking well are M. 1900, Q. 813, H.Q. 285, Badila, and Shahjahanpur No. 10. Good cultivation is in evidence on most farms, although some growers, through lack of facilities, are not ploughing deeply enough. The Hummock Plantation, probably, takes the lead in thorough cultivation on a large scale, the results obtained being largely due to this practice. Taking all the lessons of the past into consideration, it is likely that, if the growers of cane could get down deeply into the soil (not necessarily invert it), the danger of dry weather would be greatly minimised. The greater use of disc harrows is recommended. There is a good deal of dissatisfaction regarding the price of motor tractors. Owing to matters over which the farmer has no control, the price for them is excessive compared with what the primary producers have to pay in countries from whence they come. More than the average amount of horse power is necessary for many of the sugar-growers to properly work their fields nowadays, hence the difficulty the small man has in keeping pace with his more financial brother.

Barolin.

This portion of the Bundaberg district is cutting out well. The cane is ratooning satisfactorily, and the plant crop (early Spring) presents a good strike. Provided an ordinary immunity from frost, and an average rainfall is experienced, the crop next year should be a good one. Cane varieties giving very satisfactory returns are Shahjahanpur No. 10, Q. 813, D. 1135, and M. 1900 Seedling. Several growers are particularly pleased with the results obtained from Shahjahanpur. This variety is cutting with a high c.e.s. and has shown a marked resistance to frost, and gives fair tonnages per acre. Land is being cleared and planted with this cane at S. Kalkie at the present time. On this Barolin land, good results are obtained by the use of bonedust, from 3 to 5 cwt. per acre. The growers here are recommended to practice as much local experiment, relative to guiding them in the use of chemical fertilisers, as possible; also to submit soils for analyses to the Bureau. Farmers are also requested to tabulate the results of any experiments they may make and keep records of the behaviour of cane varieties. This is always valuable information to the agricultural community.

Gooburrum.

Probably, some of the best crops in the Bundaberg district this season are coming from the Gooburrum area, particularly the D. 1135 and the M. 1900 Seedling. Next year's prospects, so far, are also good. The cane is ratooning vigorously, while the young plant cane looks very healthy. Very little is left to be desired in regard to cultivation. Considerable quantities of filter-press cake have been used on this land in the past, accounting in a large measure for the improved texture of soil. Other cane varieties, besides those mentioned above, making a good showing are E.K. 1, E.K. 2, E.K. 28, J. 247, H.Q. 285, and Q. 1098. Regarding manurial results, growers have found the turning in of Mauritius bean beneficial, also the use of a fertiliser known as Mt. Etna. Average c.e.s. returns from the staple variety (D. 1135) have been about 13 per cent. No marked evidence of deterioration by disease is traceable in the cane at present.

Sharon.

Farmers are taking off satisfactory crops in this area, while the young plant crop and ratoons look well. No setbacks are being experienced so far by grubs or borer attack, nor is there marked evidence of bacteria agencies or root destroying fungi. Varieties making a good showing are Q. 813, Malagache, D. 1135, N.G. 16, Shahjahanpur No. 10, Q. 77, Badila, B. 208, M. 1900 Seedling, N.G. 24, A. and H.Q. 285. N.G. 15 has given the best c.e.s. results, so far, with averages of 15.5 per cent. Growers in this area are recommended to use lime as much as possible, on the more tenacious soils, with a view to improved texture.

Oakwood.

The growers here are carrying on with good results. The whole plantation presents a well-farmed appearance, and the farmers are taking off satisfactory crops. The cane here, also, is ratooning well, and the plant crop is making headway. Varieties outstanding at present are the D. 1135, M. 1900 Seedling, and Q. 813. Some of the growers are introducing Malagache which, judging by stools already growing, should do fairly well. Farmers are recommended to green manure as much as possible, and keep the soil in a sweet condition by occasional applications of lime. As there are a number of very progressive farmers both here and in the Gooburrum district, they are requested to tabulate any information they may have on fertilising and cane varieties, with a view to this being of benefit to the community.

Bucca.

This area presents a more extensively cultivated appearance than it has done for some years. The farmers are taking off their crops, although the dry weather after the midsummer rains gave the cane a serious setback. However, if most of the farmers get a good season next year, they will be on their feet. Cutting, ratooning, and farming operations generally were in full swing at the time of visiting, and fresh land was being planted, or, at least, land that had been out of cane for a number of years. Cane varieties at present doing well include Shahjahanpur No. 10, Q. 813, E.K. 1, Q. 1098, and D. 1135. All the first four mentioned should do well, and the farmers are recommended to give them a fair trial. Farmers at present are not greatly affected by destructive parasites or fungoid agencies. The use of lime over a large area would be beneficial at present.

Avondale (Moorlands).

On these river soils the cane is making a very fair showing, particularly the D. 1135, H.Q. 285, and M. 1900 Seedling. The H.Q. 285 is a cane that is being widely distributed at present on account of its early maturing properties, and is a good variety to plant with M. 1900 Seedling on that account. Mr. Scotney, senr., of Moorlands, has sent a considerable tonnage of this cane to various cane areas for planting. Other canes that the growers are recommended to try here are Shahjahanpur No. 10, E.K. 1, and Q. 970.

Bingera.

Crushing is now in full swing here. The cane coming to the mill is healthy and of good length. One stick of M. 1900 Seedling grown on the plantation was 8 feet 3 inches long and weighed 15 lb. Another variety, B. 156, yielded 63½ tons to the acre, with a c.e.s. value of 12.06. The best fertilising results are being obtained at present from the use of basic superphosphate and "Three sevens." As a green manure, cowpea is extensively used. Cane varieties doing well on the farms are Q. 813, E.K.1, M. 1900, and D. 1135. Rain is now wanted on the Bingera areas. However, the young plant crop looks well, and the ratoons are coming away vigorously. No sign of serious disease is in evidence, nor any marked grub infestation.

Gin Gin.

Although the long spell of dry weather militated seriously against the chance of cutting a big crop, the returns from the Gin Gin areas this year are going to be very fair. The farming is all of a high standard, and the growers are keen on raising the best cane available. Since the subdivision of the Watawa plantation, several new farmers have started on these lands and are doing well. Rain is wanted at present, but, nevertheless, the young crop is healthy and growing well. Cutting was in full swing at the time of visiting this area, consequently each farmer was working at full pressure to get his crop cut. A cane variety making a good showing on both the red soils and the Maroondan black soils is M. 1900 Seedling, a cane coming more and more into favour. The farmers are also contemplating an increased area of H.Q. 285, as recommended in previous reports. Growers are advised to discourage the burning of cane as much as possible and to plant maize and cowpea as rotation and green manure crops. Lime is essential on the black soils at Maroondan.

In all the districts under review, labour trouble is at a minimum, harvesting going with a swing. There is an excellent class of field worker in the south this season.

FRUIT FLY INVESTIGATIONS.

The Minister for Agriculture and Stock (Hon. W. N. Gillies), has made available the following report for the month of September from the Entomologist (Mr. Hubert Jarvis), stationed at Stanthorpe.

WINTERING OF FRUIT FLY.

Some time has been spent continuing the effort to discover, if practicable, any indication of the fruit fly (*B. tryoni*), wintering in the soil in the pupal form. Thus, at the Summit, search was made in and under a packing shed where a large quantity of late apples had been stored. No living fruit fly pupæ were, however, met with here.

In the Ballandean district, also, a dump was visited where 2,000 cases of fruit fly infested apples had been deposited; careful sieving of the soil under and around this dump failed to bring to light any fruit fly pupæ—empty or unhatched. When the number of maggots which must have been present in so large a quantity of infested fruit is taken into account, the total absence of fruit fly puparia in such a situation—200 feet below Stanthorpe—seems to further indicate the non-wintering in the soil of the fruit fly (*B. tryoni*), in the Granite Belt.

Again, in the Ballandean district, a dump was examined where fly-infested fruit had been buried 18 inches to 2 feet deep in the orchard. This fruit (principally late peaches) on being dug up was found to be in a more or less rotting condition, although individual fruits were still in part quite firm. A careful search in this fruit and in the surrounding soil failed to reveal any fruit fly maggots or pupæ, in spite of the fact that large numbers of fruit fly maggots must have been originally present, as was evidenced by the numerous tracks and borings still visible in the fruit and fruit pulp. Probably the fermentation of the fruit was a factor contributing to the destruction of the maggots.

FRUIT FLY IN PACKING SHEDS.

On examination of the two fruit fly pupæ found in Mr. D. Pfunder's shed, both were found to be dead; in one case dried up internally, and in the other full of decomposing liquid. I might mention here that the finding of these two pupæ in no way implies any carelessness on Mr. Pfunder's part, nor reflects in any way on his admirably cultivated and well cared for orchard. Fruit fly pupæ (empty cases) can be found in and under almost any shed in the Granite Belt where fly-infested fruit has been stored. Rather was it my intention to assemble evidence to prove that the fruit fly does not winter in the pupal form in this district, but is a seasonal visitor from lower altitudes.

THE ADULT FRUIT FLY.

A watch, such as is possible, is being kept on all native and cultivated trees and shrubs for any sign of the adult or mature fruit fly.

Fruit flies, in common with most Diptera (two winged flies), must, to sustain life, have access to some more or less liquid nectar; this want is, in nature, abundantly supplied by numerous flowers; the nectar they contain being more plentiful in the morning before the sun has had time to dry the dew from the blossoms.

Although daily increasing numbers of Diptera are now on the wing, and can be observed visiting the numerous flowering trees and plants, no fruit flies have, so far, been noted. Should this insect hibernate as a fly, it is only reasonable to conclude that the warm, genial weather now being experienced in this district would tempt at least some specimens to break their long winter fast.

Fly lures placed in various parts of the district have also failed, so far, to attract a single specimen of the Queensland fruit fly (*B. tryoni*).

An early visit to Warwick and Toowoomba districts is contemplated, with a view to determining, if possible, the nearest point to the Granite Belt at which the fruit fly is to be found:—(1) *Wintering in the soil in the pupal form*; presuming that this is its native habit (as is stated by Mr. W. W. Froggatt, Government Entomologist, New South Wales); or (2) *Overwintering as an adult fly*, a possibility favoured by the Entomologist in Chief, Mr. H. Tryon. Definite information on this point would prove of much interest and value. Possibly we shall have to go below the Darling Downs before finding our objective.

RED MITE (*BRYOBIA* Sp.).

This mite (in evidence in the egg form on the trees in many orchards) is now hatching out. Oil sprays used during the winter on these eggs, although killing a good number, have not proved a complete control; on the living mites, however, oil sprays (red oil; 30 water) should prove quite satisfactory. The lime-sulphur and arsenate sprays now soon to be used by orchardists for woolly aphis and Codlin moth, respectively, should also be beneficial in helping to control *Bryobia* mite.

VINE INJURIOUS INSECTS.

An instance of a species of *Cicada* ovipositing in grape vine wood was brought to my notice by Mr. A. E. Sewell, of Applethorpe. This is probably one of our small *Cicadas* (*Mcclampsatta* sp.), and it is to my knowledge the first instance of a *Cicada* ovipositing in the vine.

By the same source, another vine insect also was received (a borer), the larval or caterpillar form of a *Xylaryetid* moth.

I do not think that either of these insects is likely to prove a pest of economic importance; but growers cannot do better than to emulate the good example of Mr. Sewell, thus keeping a sharp lookout among the vines for any sign of sickness or of insect damage.

Visits of inspection have been made to the following districts:—The Summit, Applethorpe, Diamond Vale, Ballandean, and Enkey.

SPRAYING EXPERIMENTS.

Some time has been devoted to the testing of the possible efficacy of various sprays for peach aphis (*Myzoc-erasi*), but no satisfactory results have been so far obtained.

The control of the woolly aphis occurring on the roots of apple trees will, it is proposed, shortly be attempted; a machine for injecting liquids into the soil having been kindly loaned to the office by Mr. W. F. Barnard, of Applethorpe.

HOME TANNING—I.*

Numerous requests have reached the Department of Agriculture and Stock for directions for tanning hides on a small scale. Usually the tanning of a few hides or skins by inexperienced persons or those lacking adequate facilities cannot be recommended from the view point either of national economy or of individual profit. Sometimes, however, circumstances arise when a knowledge of tanning is of particular value on the farm. From time to time various methods of tanning have been described in the Journal. The latest information, containing possibly some new ideas, we have embodied in D.C. 230 of the U.S. Department of Agriculture on "Home Tanning," issued in July of this year, and from which the following notes are abstracted. A second instalment will be published in the next issue.—Ed.

Although good serviceable leather has been made in the Bureau of Chemistry, with the equipment and directions here described, the inexperienced operator will probably often be unsuccessful. Every attempt, however, through close observation and experimenting, should add to his experience and reduce the number of his failures. Operating on a small scale, he can not hope to obtain leather equal in appearance and possibly quality to that on the market, but he should be able to obtain leather of service for many purposes on the farm. It will also probably be found necessary at times to modify these directions, especially as to equipment, to suit conditions or in tanning other kinds of leather. Success in this will depend largely upon the experience and ingenuity of the individual.

General Information.

Complete directions are given in this circular under each method of tanning described. This results in repeating the description of some operations which are common to nearly all methods of tanning, but the repetition is necessary to avoid the confusion that otherwise would result from disconnected directions. The details essential in explaining the numerous steps should not prove confusing. The directions need not, of course, be memorised, but they should be carefully studied until they are thoroughly understood before the operation is begun. All supplies and equipment should be obtained and plans should be fully made before beginning the work.

Unless otherwise specified, tanning operations are best done at a uniformly moderate temperature. For convenience there should be a handy supply of fresh water and also a drain. All the operations can be done in tight, clean wooden barrels, of 40 to 60 gallons capacity. When not in use the barrels should be kept clean and full of water. Half barrels and wooden buckets and tubs are very convenient for many purposes. Iron containers should never be used.

Hides and Skins.

The hide or skin may be started in process as soon as it has been taken-off, drained, and cooled from the animal heat. Overnight will be long enough. If you are not ready to begin tanning, or if you have at one time more hides than you can handle, they can be kept safely for three to five months in a thoroughly salted condition. During storage or tanning the hides must never be allowed to freeze or heat. Some tanners claim that salting before tanning is helpful, and it will certainly not do any harm to salt the hide for a few days before tanning.

The kind of leather which can be made from a hide or skin depends largely upon its weight and size. The tanning trade makes distinctions in hides and skins based mainly upon the size and age of the animal and upon the class of leather. Hides from the larger and adult animals are suitable for sole, harness, belting or heavy leathers. Skins from the smaller animals, such as sheep, goats, calves, and deer, are made into light and fancy leathers. While there are other commercially important sources of hides and skins, the most important ones, with the exception of furs, are the usual domesticated farm and range animals. As a general rule, the thickness of the finished leather will be about that of the untanned hide, and this should be a guide in selecting skins for different kinds of leather.

The first essential for a satisfactory yield of good leather is a good, sound, clean hide or skin. Skinning should be done properly, without cutting or scoring the hide, at the same time leaving on it no fat and meat, which must be removed later before tanning and which, if left on, increases the chances of spoiling or rotting the hide.

Bark-tanned Sole and Harness Leather.

Read the directions through before starting this work.

These directions have been prepared for tanning a single heavy cow, steer, or bull hide, weighing from 40 to 70 lb., into bark-tanned leather suitable for sole, harness, or belting.

* Department Circular 230, by R. W. Frey, I. D. Clarke, and F. P. Veitch, Bureau of Chemistry, United States Department of Agriculture (July 1922).

Slaking Lime.

Put 6 to 8 lb. of burnt or caustic lime in a clean half barrel, wooden tub, or bucket, of at least 5 gallons capacity. Use only good-quality lime, free from dirt and stones and never air-slaked. To the lime add about 1 quart of water. As the slaking begins, add more water, a little at a time, to keep the lime moist; do not pour in water enough to quench the slaking. After the lime appears to be slaked, stir in 2 gallons of clean water. Do all this just exactly as you would make white-wash. Slake the lime on the day before you start soaking the hide, and keep the limewater covered with boards or sacks until ready for use.

If available, fresh hydrated lime, not air-slaked, may be used instead of slaking burnt or caustic lime. In this case use 8 to 10 lb. in 4 or 5 gallons of water.

Soaking and Cleaning.

If the hide has been salted, shake it vigorously to remove most of the salt. Spread it out, hair side down, and trim off the tail, head, ears, all ragged edges, and shanks.

Place the hide, hair side up, lengthwise, over a smooth log or board, and, with a sharp knife, split from neck to tail, straight down the backbone line, into two half hides, or "sides." It will be more convenient in subsequent handling, especially when the hide is large, to then split each side lengthwise through the "break," just above the flanks, into two strips, making the strip with the backbone edge about twice as wide as the belly strip. Thus a whole hide will give two sides or four strips. In these directions the "side" should be taken to mean either side or strip, as the case may be.

Fill a 50-gallon barrel with clean, cool water. Hang the sides, flesh out, over short sticks and suspend them in the barrel of water to soak for two or three hours. Stir them about frequently to soften, loosen, and wash out the blood, dirt, manure, and salt. (The short sticks or pieces of rope may be held in the proper position by tying a loop or cord on each end and catching the loops over nails in the outside of the barrel near the top.) After soaking for about three hours, take out the sides, one at a time, and place them, hair side up, over a "beam." (A ready-made beam can be purchased, but a fairly satisfactory one can be made from a very smooth slab, log, or thick planed board from 1 to 2 ft. wide and 6 to 8 ft. long. The slab or log is inclined, with one end resting on the ground and the other extending over a box or trestle so as to be about waist high.) With the side lying hair side up over the beam, scrub off all dirt and manure, using, if necessary, a good stiff brush; then wash off with several bucketfuls of clean water.

Now turn the side over, flesh side up, and scrape or cut off any meat or flesh. Work over the entire flesh side with the back edge of a drawing or butcher knife, held firmly by both ends while pushing away from you hard against the hide or skin. Wash off with a bucket or two of clean water. This working over should always be done. Refill the soak barrel with clean, cool water and hang the sides in it as before, working them about frequently until they are soft and flexible. A green or fresh hide usually needs to be soaked for not more than twelve or fourteen hours; a green salted hide for not more than twenty-four to forty-eight hours.

When the sides are properly softened throw them over the beam and thoroughly scrape off all remaining flesh, fat, or meat. It is of the greatest importance to remove all this meat. When it cannot be scraped off, cut it off, but be careful not to cut into the hide itself. Even should there appear to be no flesh to take off and nothing appears to be removed, it is necessary to thoroughly work over the flesh side in this way with the back of a knife. Finally, wash off with a bucketful of clean water.

The hide must be soft, pliable, and clean all over before being put into the lime.

Liming to Remove the Hair.

Wash out the soak barrel and pour into it all of the slaked lime. Nearly fill the barrel with clean, cool water, and stir thoroughly. Hang the sides or strips again over the short sticks or pieces of rope, hair side out, and suspend them in the barrel so that they are completely covered by the lime water. See that the sides are suspended with as few folds or wrinkles as possible and also be sure not to trap any air under the sides. Keep the barrel covered. Plunge the hides and stir the lime-water three or four times each day until the hair will come off easily. This will take from six to ten days in summer, and possibly as many as sixteen days in winter. When thoroughly limed the hair can be rubbed off readily with the hand. Early in the liming process it will be possible to pull out the hair, but the hide must be left

in the lime until the hair comes off by rubbing over with the hand. For harness and belting leathers leave the hide in the limes for three to five days after this condition has been reached.

When limed, throw the side, hair side up, over the beam, and, with the back edge of a drawing or butcher knife, held nearly flat against the hide, push off the hair from all parts of the hide. If the side is sufficiently limed, a curdy or cheesy layer of skin rubs off with the hair. If this layer does not rub off, the side must be returned to the limewater. After removing the hair, put the side back again for another day, until any fine hairs that may remain can be easily scraped off. Now thoroughly work over the grain or hair side with a dull-edged tool to "scud" or work out as much lime, fat, and dirt as possible. Then turn the side over and do the same thing, being sure to remove all fleshy matter. Shave down to the hide itself by scraping or by using a very sharp knife with a motion somewhat like that of shaving your face. Rinse off both sides of the hide with clean water. Wash the hide in cool, clean water for six to eight hours, changing the water frequently, and then proceed as under "Deliming."

The lime, limewater, sludge, and fleshings from the liming process may be used as fertiliser, being particularly good for acid soils. The hair, as it is scraped from the hide, may be collected separately, and, after being rinsed several times, may be used in plastering. If desired, it can be thoroughly washed with many changes of water until absolutely clean and, after drying out in a warm place, can be used for padding, upholstering, insulation of pipes, &c.

Deliming.

Buy 3 oz. of U.S.P. lactic acid (or 9 oz. of tannery 22 per cent. lactic acid). Nearly fill a barrel with clean, cool water and stir in the lactic acid. Now hang in the un haired sides or strips. Pull them up, and stir frequently for about twenty-four hours. Take out the sides, work over, "scud" them thoroughly as directed under "Liming," and hang them in a barrel of cool water. Change the water several times, and finally leave them in the water overnight.

If lactic acid cannot be obtained, use one-half gallon of vinegar instead.

Tanning.

The hide or sides are now ready for the actual tanning. From fifteen to twenty days before this stage is reached weigh out 30 to 40 lb. of good-quality, finely-ground oak or hemlock bark and pour on to it about 20 gallons of boiling water. (Finely-ground bark, with no particles larger than a grain of corn, will give the best results. Simply chopping the bark into coarse pieces will not do. Do not let the tan liquor come in contact with iron vessels. Use the purest water available. Rain water is best.) Let this bark infusion stand in a covered vessel until ready to use. Stir it up occasionally. When ready to start tanning, strain off the bark liquor through a clean, very coarse sack into the tanning barrel. Fill the barrel about three-fourths full with water, rinsing the bark with this water so as to get out as much tannin as possible. Add two quarts of vinegar. Stir well. Hang the sides or strips, from the deliming, over sticks, and suspend them in this tanning liquor with as few folds and wrinkles as possible. Move the sides about and change their position often so as to get an even colour. Just as soon as this has been started, weigh out the same quantity of ground bark and soak it with hot water as before. Let this second bark liquor stand until the sides have become evenly coloured, or for from ten to fifteen days. Then add one-fourth of the second bark liquor, taking out from the tanning barrel first the same amount of old liquor as you are going to add of the new or second bark liquor. Also add about 2 quarts more of vinegar and stir it in well. After five days add another fourth of the tan liquor only (no vinegar); do this every five days until the liquor is used up.

About thirty-five days after the actual tanning has been started, the sides are ready for the first bark. (The progress of the tanning varies somewhat with conditions and can best be told by inspecting a small sliver cut from the edge of the hide. The fresh cut should show two somewhat dark or brown streaks coming in from each surface of the hide. These streaks will be rather narrow, about as wide as a heavy pencil line.) Weigh out about 40 lb. of fine bark and just moisten it with hot water. Do not add more water than the bark will soak up. Pull the sides out of the tan liquor and dump in the moistened bark, keeping as much of the old tan liquor in the barrel as possible. Mix thoroughly, and while mixing hang the sides back in the barrel. Actually bury them in the bark; all parts of the sides must be kept well down in the bark mixture. Leave the sides in this bark for about six weeks, moving them about once in a while.

After six weeks pull the sides out (a cutting should show that the tanning has spread nearer to the centre); pour out about half the liquor. Stir the bark in the

barrel, hang the sides back, and fill the barrel with fresh finely-ground bark. Leave the sides in for about two months, shaking the barrel from time to time, and adding bark and water as needed to keep the sides completely covered.

At the end of this time the hide should be evenly coloured all the way through, without any white or raw streak in the centre of a cut edge. If it is not struck through it must be left longer in the wet bark and more bark may be necessary. For harness, strap, and belting leather the sides may be taken out of the tan liquor at this stage, but for sole leather they must be left for two months longer. When fully tanned through the sides are ready for finishing.

Finishing.

Harness and Belting Leather.—Take the sides from the tan liquor, rinse them off with water, and scour the grain side with plenty of warm water and a stiff brush. This must be very thoroughly done until most of the tan liquor and water has been rubbed or pressed out. Then go over the sides with a "slicker," working them out on the grain side in all directions. (A slicker can be made from a piece of copper or brass, about one-fourth inch thick, 6 inches long, and 4 inches wide. One long edge of the slicker is mounted in a wooden handle, and the other long edge, well rounded, is used to work over the sides by pushing hard against them and away from yourself.) For harness, belting, and the like this scouring and slicking out must be thoroughly done. When the sides are still damp, but not very wet, go over the grain side with a liberal coating of neat's-foot or cod oil. Hang up the sides and let them dry out slowly. When dry, take them down and dampen them well by dipping in water or rolling up in wet sacking or burlap. When uniformly damp and limber, evenly brush or mop over the grain side with a thick coating of a dubbin made by melting together about equal parts of cod oil and tallow or neat's-foot oil and tallow. When cool, this dubbin must be soft and pasty, but not liquid, and it must be melted before using and applied warm. Hang up the sides again and leave until thoroughly dried. When dry, remove the tallow from the grain by working over with the slicker. If more grease in the leather is desired, dampen back and apply another coating of the dubbin, giving a light application also to the flesh side. When again dry remove the tallow. Rubbing over with sawdust will help to take up any surface oiliness.

If it is desired to blacken the leather, this must be done before greasing. A black dye solution can be made by dissolving one-half ounce of water-soluble nigrosine in $1\frac{1}{2}$ pints of water, with the addition, if handy, of several drops of ammonia. Evenly mop or brush this solution over the dampened but ungreased leather, and then grease as directed in the preceding paragraph.

Sole Leather.—Take the sides from the tan liquor and rinse them off thoroughly with clean water. Press out most of the water, and hang them up until they are only damp; then apply a good coating of neat's-foot or cod oil to the grain side. Again hang up until thoroughly dry.

When repairing shoes with this leather it is advisable, after cutting out the piece for soling, to dampen and hammer it down well, and then, after putting it on the shoe, to make it waterproof and more serviceable by setting the shoe for about fifteen minutes in a shallow pan of melted grease or oil. The grease or oil must not be hotter than the hand can bear. Any good oil or grease will do, and the following simple formulas have been found to be satisfactory:—

Formula 1:—							Ounces.
Neutral wool grease	..	..	..	..	..	..	8
Dark petrolatum	..	..	..	..	..	..	4
Paraffin wax	..	..	..	..	..	..	4
Formula 2:—							
Petrolatum	..	..	..	..	..	..	16
Beeswax	..	..	..	..	..	..	2
Formula 3:—							
Petrolatum	..	..	..	..	..	..	8
Paraffin wax	..	..	..	..	..	..	4
Wool grease	..	..	..	..	..	..	4
Crude turpentine gum (gum thus)	..	..	..	..	..	..	2
Formula 4:—							
Tallow	..	..	..	..	..	..	12
Cod oil	..	..	..	..	..	..	4

(In the next issue the chrome process of tanning will be described.)

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, SEPTEMBER, 1922.

The results for the month of September were, on the whole, fairly satisfactory. In the light section, Mr. C. H. Singer's White Leghorns topped the score with 168 eggs, closely followed by Mr. N. A. Singer with 167; the latter's D. bird has put up a fine unfinished run of 40 eggs. This bird is a fine layer and a good worker. In the heavy breeds Mr. R. Burns leads for the month with 157 eggs, the second place being taken by Mr. W. Becker's Langshans. Two deaths occurred in the course of September. Some trouble was experienced with broodies in the course of the month. Following are the individual records:—

Competitors.	Breed.	Sept.	Total.
LIGHT BREEDS.			
*N. A. Singer	White Leghorns ...	167	747
C. H. Singer	Do.	168	716
W. and G. W. Hindes	Do.	139	685
*Bathurst Poultry Farm	Do.	135	623
*T. Fanning	Do.	139	594
*W. A. Wilson	Do.	126	585
J. H. Jones	Do.	130	583
*G. Trapp	Do.	129	582
*Mrs. L. Andersen	Do.	136	581
*S. L. Grenier	Do.	134	577
*R. Gill	Do.	146	574
*J. M. Manson	Do.	149	572
A. G. C. Wenck	Do.	129	569
*W. Becker	Do.	137	564
*H. P. Clarke	Do.	133	555
*G. Williams	Do.	125	510
*J. W. Newton	Do.	138	540
*R. C. Cole	Do.	137	532
*O. Goos	Do.	116	531
*C. Goos	Do.	138	521
B. Hawkins	Do.	104	521
*Oakleigh Poultry Farm	Do.	142	511
*H. Fraser	Do.	125	510
J. Purnell	Do.	100	510
*Mrs. R. Hodge	Do.	145	509
A. Maslin	Do.	104	506
*J. W. Short	Do.	131	487
*Mrs. E. White	Do.	113	482
*Thos. Taylor	Do.	128	477
T. H. Craig	Do.	119	476
*C. M. Pickering	Do.	133	473
*R. C. J. Turner	Do.	133	472
*M. F. Newberry	Do.	121	472
N. J. Nairn	Do.	129	467
E. Stephenson	Do.	119	450
G. F. Richardson	Do.	105	448
*F. Birchall	Do.	115	448
*E. A. Smith	Do.	124	445
E. Symons	Do.	120	437
B. C. Bartlem	Do.	114	434
A. Anders	Do.	111	393
Brampton Poultry Farm	Do.	104	375
H. Trappett	Do.	128	369
Parisian Poultry Farm	Brown Leghorns ...	110	220

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	August.	Total.
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	157	650
*A. E. Walters	Do.	133	646
*T. Hindley	Do.	131	604
*H. M. Chaille	Do.	123	596
*R. Holmes	Do.	112	593
Mrs. A. Kent	Do.	110	563
Jas. Hutton	Do.	101	556
Wambo Poultry Farm	Do.	121	550
*C. C. Dennis	Do.	141	545
*E. F. Dennis	Do.	118	515
Mrs. A. E. Gallagher	Do.	124	509
*Jas. Potter	Do.	110	495
R. Iunes	Do.	122	489
*Rev. A. McAllister	Do.	93	470
Mrs. L. Maund	Do.	113	469
V. J. Rye	Do.	105	452
W. Becker	Chinese Langshans ...	145	447
H. B. Stephens	Black Orpingtons ...	129	442
*Parisian Poultry Farm	Do.	132	434
Jas. Hitchcock	Do.	102	430
C. Doan	Do.	91	427
C. Rosenthal	Do.	103	388
W. C. Trapp	Do.	90	357
R. Burns	Silver-laced Wyandottes	116	335
*J. E. Smith	Plymouth Rocks ...	107	300
*Miss L. Hart	Rhode Island Reds ...	102	177
Total ... ..	...	8,659	35,102

* Indicates that the pen is being single tested.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
N. A. Singer	111	142	114	128	125	127	747
W. and G. W. Hindes	127	106	118	110	119	105	685
Bathurst Poultry Farm	86	86	110	115	125	101	623
T. Fanning	71	123	111	109	126	54	594
W. A. Wilson	95	89	79	112	100	110	585
Geo. Trapp	107	87	91	105	94	98	582
Mrs. L. Andersen	118	74	103	96	93	97	581
S. L. Grenier	94	65	104	102	105	107	577
R. Gill	106	103	112	90	75	88	574
J. M. Manson	97	83	105	81	108	98	572
W. Becker	92	64	106	93	99	110	564
H. P. Clarke	96	77	96	106	90	90	555
G. Williams	84	93	104	90	89	80	540
J. W. Newton	113	89	104	72	97	65	540
R. C. Cole	102	95	99	61	89	86	532
O. Goos	89	71	99	110	94	68	531
C. Goos	67	75	73	98	114	94	521
Oakleigh Poultry Farm	98	76	91	75	74	97	511
H. Fraser	88	98	87	76	71	90	510
Mrs. R. Hodge	110	57	83	83	102	74	509
J. W. Short	85	83	94	69	65	91	487

EGG-LAYING COMPETITION—*continued.*
 DETAILS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS— <i>continued</i>							
Mrs. E. White	99	23	95	60	107	98	482
Thos. Taylor	100	68	85	80	79	65	477
C. M. Pickering	100	95	59	75	84	60	473
M. F. Newberry	85	57	53	110	69	98	472
R. C. J. Turner	85	70	92	87	84	54	472
F. Birchall	80	86	52	41	99	90	448
E. A. Smith	90	64	91	83	55	62	445

HEAVY BREEDS.

R. Burns	101	112	95	118	113	111	650
A. E. Walters	106	104	88	104	124	120	646
T. Hindley	82	103	66	138	137	78	604
H. M. Chaille	113	95	111	100	105	72	596
R. Holmes	74	124	99	98	94	104	593
C. C. Dennis	90	103	94	79	97	82	545
E. F. Dennis	90	82	107	31	96	109	515
J. Potter	77	87	96	79	98	58	495
Rev. A. McAllister ..	87	101	104	54	25	99	470
Parisian Poultry Farm ..	53	73	85	54	83	86	434
J. E. Smith	34	62	48	40	53	63	300
Miss L. Hart	34	39	27	36	10	31	177

CUTHBERT POTTS, Principal.

WEIGHT OF EGGS, SINGLE HEN PENS.

	A.	B.	C.	D.	E.	F.	Average
	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.
LIGHT BREEDS.							
R. Gill	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$
W. and G. W. Hindes ..	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$
J. M. Manson	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$
M. F. Newberry	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$
F. Birchall	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$
T. Fanning	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$
Mrs. E. White	2	2	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$
H. Fraser	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$
Oakleigh Poultry Farm ..	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2	2 $\frac{1}{8}$
E. A. Smith	2 $\frac{1}{8}$	2	2 $\frac{1}{8}$	2	2 $\frac{1}{8}$	2	2 $\frac{1}{8}$
W. Becker	2 $\frac{1}{8}$	2	2	2	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2
R. C. Cole	1 $\frac{7}{8}$	1 $\frac{7}{8}$	2	2	2 $\frac{1}{8}$	2	2
Mrs. R. Hodge	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$
R. C. J. Turner	2	2	2 $\frac{1}{8}$	2	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2
C. Goos	2 $\frac{1}{8}$	2 $\frac{1}{8}$	1 $\frac{7}{8}$	2	1 $\frac{7}{8}$	2	2
H. P. Clarke	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{1}{8}$
T. Taylor	1 $\frac{7}{8}$	2	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2	2 $\frac{1}{8}$	2
C. M. Pickering	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{8}$
Mrs. L. Andersen	1 $\frac{3}{4}$	2	2	2 $\frac{1}{4}$	2	2	2
S. L. Grenier	2	2 $\frac{1}{4}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{1}{8}$
N. A. Singer	2 $\frac{1}{4}$	2 $\frac{3}{8}$	2 $\frac{1}{4}$	2 $\frac{3}{8}$	2 $\frac{3}{8}$	2 $\frac{3}{8}$	2 $\frac{3}{8}$
J. W. Newton	1 $\frac{7}{8}$	2	2	2	2	2 $\frac{1}{8}$	2
Geo. Trapp	1 $\frac{7}{8}$	1 $\frac{7}{8}$	2	2	2 $\frac{1}{8}$	2	2
G. Williams	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2	2	1 $\frac{7}{8}$	1 $\frac{7}{8}$	2
W. A. Wilson	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{8}$
O. Goos	1 $\frac{7}{8}$	2	1 $\frac{7}{8}$	2	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2
J. W. Short	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2	2 $\frac{1}{8}$	2	2	2 $\frac{1}{8}$
Bathurst Poultry Farm ..	2 $\frac{1}{8}$	2	2	2	1 $\frac{7}{8}$	1 $\frac{3}{4}$	2

WEIGHT OF EGGS, SINGLE HEN PENS—*continued*.

	A.	B.	C.	D.	E.	F.	Average.
	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.
HEAVY BREEDS.							
H. M. Chaille	2	2	2 $\frac{1}{8}$	2 $\frac{1}{8}$	1 $\frac{7}{8}$	2 $\frac{1}{8}$	2
J. Potter	2	2	2	2	2	2 $\frac{1}{4}$	2
Parisian Poultry Farm	2	1 $\frac{7}{8}$	1 $\frac{7}{8}$	1 $\frac{7}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2
Rev. A. McAllister	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{1}{8}$
J. E. Smith	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$
R. Burns	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$
E. F. Dennis	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{1}{8}$
T. Hindley	1 $\frac{7}{8}$	2 $\frac{1}{8}$	1 $\frac{7}{8}$	1 $\frac{7}{8}$	1 $\frac{7}{8}$	1 $\frac{7}{8}$	1 $\frac{7}{8}$
A. E. Walters	1 $\frac{7}{8}$	2 $\frac{1}{8}$	2	2	1 $\frac{7}{8}$	2 $\frac{1}{8}$	2
C. C. Dennis	2 $\frac{1}{8}$	2 $\frac{1}{8}$	2	2	2	2	2
R. Holmes	1 $\frac{7}{8}$	2	2	2 $\frac{1}{4}$	2	2 $\frac{1}{8}$	2
Miss L. Hart	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2	2 $\frac{1}{8}$

GROUP PENS.

	Average Weight.		Average Weight.

LIGHT BREEDS.

	Oz.		Oz.
T. H. Craig	2 $\frac{1}{8}$	A. Martin	2
H. Trappett	1 $\frac{7}{8}$	Parisian Poultry Farm	1 $\frac{7}{8}$
H. G. C. Wenck	2 $\frac{1}{8}$	C. H. Singer	2 $\frac{1}{8}$
B. Hawkins	2 $\frac{1}{8}$	R. C. Bartlem	2
J. Purnell	2	Brampton Poultry Farm	1 $\frac{7}{8}$
A. Anders	2 $\frac{1}{8}$	E. Symons	2 $\frac{1}{8}$
G. H. Richardson	2 $\frac{1}{8}$	J. H. Jones	2
N. J. Nairn	1 $\frac{7}{8}$	E. Stephenson	2 $\frac{1}{8}$

HEAVY BREEDS.

R. Burns	2	H. B. Stephens	2
W. C. Trapp	1 $\frac{7}{8}$	R. Innes	2
Mrs. L. Maund	2	Jas. Hitchcock	2
C. Rosenthal	2	Mrs. A. Kent	1 $\frac{7}{8}$
V. J. Rye	1 $\frac{7}{8}$	J. Hutton	2 $\frac{1}{8}$
W. Becker	2	Mrs. A. E. Gallagher	2 $\frac{1}{8}$
Wombo Poultry Farm	2	C. Doan	2

THE BIRTH OF ANOTHER CO-OPERATIVE ENTERPRISE.

Shipping Queensland Eggs to London.

Every person who is engaged in poultry-raising knows well that eggs at their present market value do not cover actual cost of production, and the lot of the poultry farmer would have been even worse had it not been for a new avenue of disposal of the surplus supply of eggs by export. Some millions of eggs have been sent South during the present "glut" season, but it is to the credit of the "Nupba" Co-operative Society Limited, that they arranged and carried out the first direct shipment of eggs from Brisbane to London.

The steamer "Leitrim" recently sailed for England with 400 odd cases, representing some 150,000 eggs, consigned from the society to the Overseas Farmers' Co-operative Federation. Although a very small quantity comparatively, this shipment is extremely important as it marks the commencement of a new era for the Queensland poultry farmer.

This useful society, which was founded by the Queensland Branch of the National Utility Poultry Breeders' Association, was primarily intended to supply the needs of the poultrymen with foodstuffs for their flocks at a low figure; but, in addition to doing this, the directorate, seeing the necessity of finding other markets for eggs during the season of heavy production, turned its attention to the handling of eggs. It is now prepared to accept consignments from all members; in fact, it is desired and hoped that ere long all persons engaged in the industry will recognise the need for organisation, and by sending their eggs through the society's pool ensure the fullest possible return for their product.

Latest reports from London as to the state of the market there seem to indicate that the financial results of the venture will be highly satisfactory.

The society has adopted the policy of paying a certain sum per dozen as an advance against the eggs, and when the proceeds come to hand from London, the expenses will be deducted and the balance distributed amongst all the suppliers on a *pro rata* basis.



PLATE 79.—PART OF A RECENT CONSIGNMENT OF EGGS SHIPPED BY THE "NUPRA" CO-OPERATIVE SOCIETY TO LONDON.

Every care has been taken in selection and packing so that the eggs should arrive safely and open up in an attractive manner. Particular attention has been paid to quality and size and no egg under 2 oz. in weight is being packed. The cases, which are made from specially selected timber, are divided into two compartments (each of which holds 15 dozen eggs), and white and brown eggs are packed in separate boxes. White patent fillers and wood wool are used for protection against breakage, and the general appearance of the eggs should satisfy the most exacting. On the outside of the cases "Eggs—Product of Queensland" is stamped in big lettering, and the State should have reason to be proud of this shipment.

The Agricultural Council has already recognised the need for fostering this industry, which already represents millions of pounds of wealth to Australia, and is capable of unlimited extension. When one considers that Great Britain consumes over 12,000,000 eggs daily, it will be seen what an opportunity there is for export to that country, particularly as our season of heavy production occurs just prior to the English winter.



PLATE 80.—EGGS FOR LONDON, A RIVERSIDE SCENE.

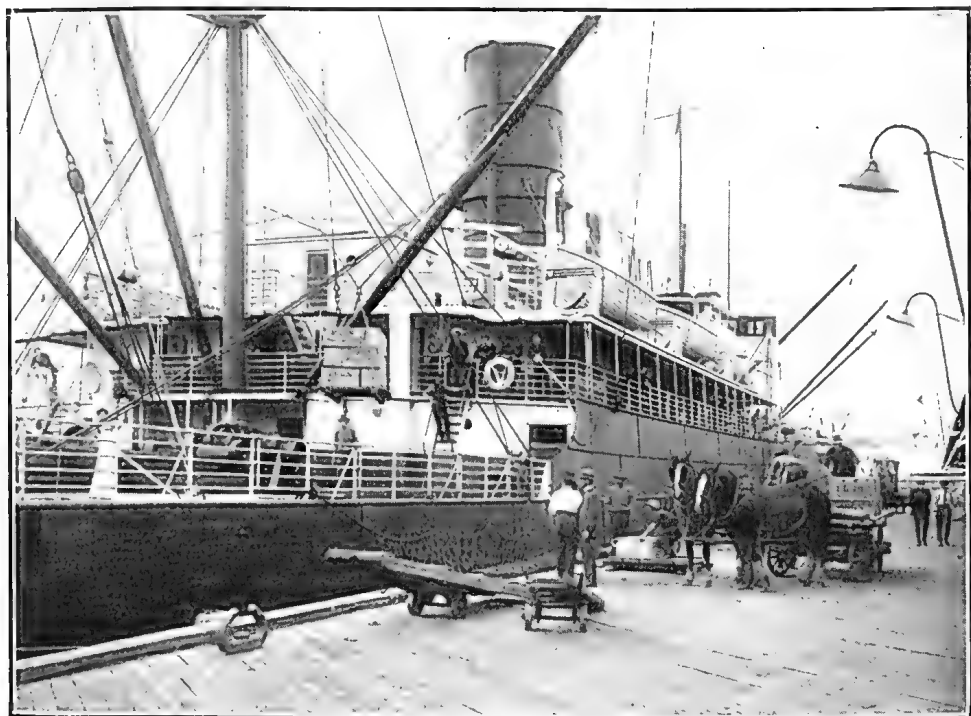


PLATE 81.—THE S.S. "LEITRIM" LOADING EGGS AT BRISBANE FOR LONDON.

NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION COMPETITION.

Two thousand six hundred and eighty-nine eggs were laid during the month of October, or an average of 22.41 eggs per bird for the period. There have been one or two cases of broodiness, but the proportion has been very small indeed. The health of the birds generally still continues to be good, and in this respect, as well as the records of the birds, the competition compares very favourably with other similar contests.

Pen No.	Owner.	October.	Total.	Pen No.	Owner.	October	Total.

WHITE LEGHORNS.

29	A. S. Walters ...	26	177	59	C. Pickering ...	2	131
2	A. Niel ...	31	176	16	T. Flood ...	8	130
33	J. Purnell ...	26	169	57	M. Newberry ...	21	129
43	J. J. Davies ...	29	168	36	Parisian Poultry Farm	16	128
66	A. Cowley ...	29	166	82	E. C. Raymond ...	20	128
19	L. Andersen ...	26	164	54	A. W. Ward ...	25	128
27	Oakleigh Poultry Farm	27	161	40	P. J. Fallon ...	27	128
77	Kelvin Poultry Farm	23	160	26	P. F. Adams ...	23	127
62	H. Sturman ...	23	160	8	J. Harrington ...	18	125
64	G. Trapp ...	28	159	41	G. Williams ...	20	125
12	J. Potter ...	29	158	73	A. F. Knowles ...	10	124
7	J. Harrington ...	25	158	76	A. J. Bourne ...	26	124
72	Enroh Pens ...	25	157	18	R. Shaw ...	26	123
38	Carinya Poultry Farm	21	155	74	A. F. Knowles ...	10	121
25	P. F. Adams ...	21	155	22	E. Stephenson ...	20	121
34	J. Purnell ...	26	155	56	W. H. Lingard ...	22	121
61	H. Sturman ...	21	151	51	F. R. Koch ...	23	121
70	A. Hodge ...	26	151	37	Carinya Poultry Farm	25	119
68	R. D. Chapman ...	26	148	65	A. Cowley ...	22	115
47	M. J. Lyons ...	20	146	20	L. Anderson ...	25	115
55	W. H. Lingard ...	25	145	69	A. Hodge ...	9	113
63	G. Trapp ...	26	145	14	J. Hutton ...	23	109
53	A. W. Ward ...	28	143	24	M. H. Campbell ...	30	109
24	M. H. Campbell ...	20	142	28	Oakleigh Poultry Farm	4	107
39	P. J. Fallon ...	26	142	5	Wambo Poultry Farm	22	107
44	J. J. Davies ...	24	141	11	J. Potter ...	23	107
13	J. Hutton ...	26	140	81	E. C. Raymond ...	21	105
46	M. J. Lyons ...	23	138	45	H. Needs ...	22	105
52	F. R. Koch ...	27	138	60	C. M. Pickering ...	23	104
30	A. S. Walters ...	21	137	31	R. H. Woodcock ...	23	103
79	W. Bliss ...	31	136	15	T. Flood ...	18	101
9	P. Ruddick ...	22	135	71	Enroh Pens ...	24	101
10	P. Ruddick ...	24	135	80	W. Bliss ...	25	101
49	R. Turner ...	23	135	50	R. Turner ...	22	100
35	Parisian Poultry Farm	20	134	78	Kelvin Poultry Farm	26	96
6	Wambo Poultry Farm	20	134	3	W. Becker ...	25	92
67	R. D. Chapman ...	27	134	4	W. Becker ...	19	81
17	R. Shaw ...	26	133	75	A. J. Bourne ...	26	74
46	H. Needs ...	25	133	32	R. H. Woodcock ...	21	72
58	M. Newberry ...	30	133	21	E. Stephenson ...	22	67
42	G. Williams ...	23	132	1	A. Niel ...	0	57

NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION COMPETITION—*continued*.

Pen No.	Owner.	October	Total.	Pen No.	Owner.	October.	Total.
BLACK ORPINGTONS.							
96	R. A. Boulton ...	28	169	99	L. J. Prichard ...	18	126
107	E. Walters ...	22	162	102	Parisian Poultry Farm	21	124
88	W. A. Blake ...	26	162				
92	C. C. Dennis ...	29	160	89	T. Brotherton ...	29	121
105	H. Pearce ...	23	152	111	A. Niel ...	26	119
93	E. F. Dennis ...	28	148	84	J. Hutton ...	23	119
95	R. A. Boulton ...	24	146	109	Wambo Poultry Farm	23	118
101	Parisian Poultry Farm	19	141				
				87	W. A. Blake ...	30	114
108	E. Walters ...	24	141	106	H. Pearce ...	21	112
91	C. C. Dennis ...	26	141	110	Wambo Poultry Farm	18	100
100	L. J. Pritchard ...	22	138				
90	T. Brotherton ...	5	133	112	A. Niel ...	27	94
83	J. Hutton ...	22	133	98	Enroh Pens ...	17	93
103	J. Potter ...	18	132	94	E. F. Dennis ...	20	91
104	J. Potter ...	18	130	97	Enroh Pens ...	24	71
86	Kidd Bros. ...	12	128	85	Kidd Bros. ...	0	10
OTHER BREEDS.							
118	J. H. Jones ...	14	150	114	Parisian Poultry Farm	17	106
120	T. J. Carr ...	26	143				
116	G. and W. Hindes ...	22	130	115	G. and W. Hindes	26	100
117	J. H. Jones ...	8	115	113	Parisian Poultry Farm	23	91
119	T. J. Carr ...	26	112				

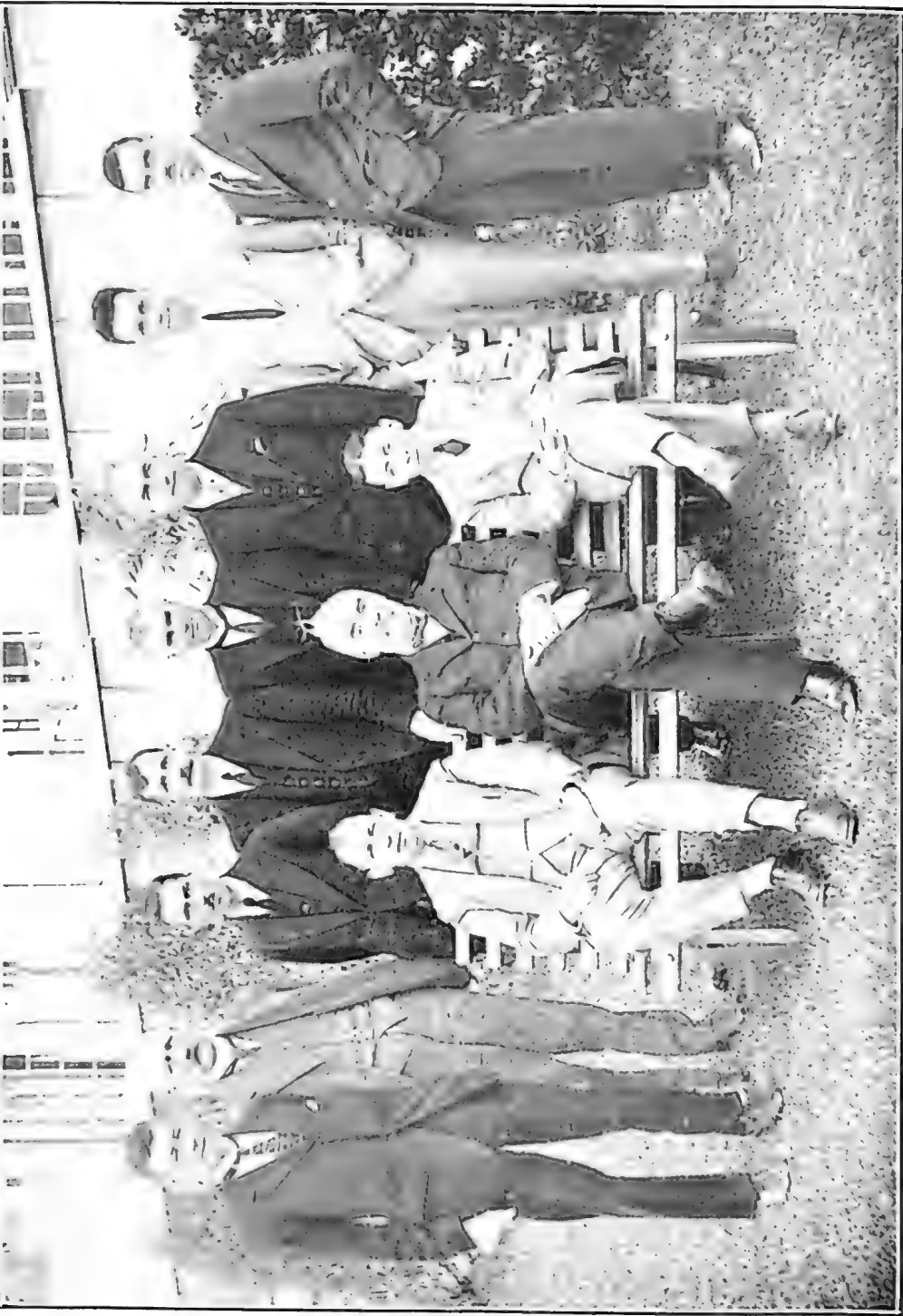
THE PRICE OF COTTON.

Conditions of the Government Advance.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has announced that, in accordance with the recent decision of the Government upon the question of ratoon cotton, the conditions under which advances will be made to growers of seed cotton, during the seasons 1922-1923 and 1923-1924, will be as follows:—

Season ending 31st July, 1923.

1. An advance of 5½d. per pound will be made on seed cotton of good quality (as defined in No. 2) and free from disease, delivered on rail or water.
2. Good quality cotton means seed cotton that is not ratoon cotton. It must be clean, properly packed, and not immature, stained, dirty, or otherwise damaged.
3. Seed cotton is cotton derived from seed planted annually. Ratoon cotton is applied to the second or any subsequent growth made by plants which have already been raised from seed, irrespective of whether such plants have borne a crop or not.
4. No advance will be made upon ratoon cotton, and such cotton will only be accepted at the grower's risk. It will not be passed through the gins until after the operations of the season for annual seed cotton have been completed, and it will not be exported to Great Britain. Full particulars of such ratoon cotton must be sent to the manager of the ginnery to which it is consigned at the time of despatch, and any ratoon cotton found to be mixed with annual seed cotton in any consignment will entail the rejection of the whole consignment.
5. Seed cotton found to be not of good quality as defined in these conditions may be rejected, subjected to a lesser advance, or treated on growers' account as the Minister may decide.



Sitting.—
HAROLD PARKER, Manager,
Messrs. William Calvert,
and Sons, Preston.

HIS EXCELLENCY SIR
MATTHEW NATHAN, P.C.,
G.C.M.G.

CROMPTON WOOD, Managing
Director, Messrs. Smith
and Rathbone.

Standing.—
HON. CRAWFORD VAUGHAN,
Managing Director, Aus-
tralian Cotton-growing
Association.

F. G. L. SCRIVEN, Under
Secretary, Department of
Agriculture and Stock.

L. ATKIN, Instructor in
Cotton Culture.

COLONEL HUMLEY, C.M.G.,
Commonwealth Immi-
gration Department.

HON. W. N. GILLES, Minis-
ter for Agriculture and
Stock.

W. P. ASCROFT, Director
Australian Cotton-grow-
ing Association.

R. L. HARDING, Secretary
to the Delegation.

E. F. CARTER, Consulting
Engineer.

Photo: Dept. Agriculture and Stock.]

6. All grading and inspection of cotton at ginneries subject to an advance will be under the supervision and direction of officers of the Department of Agriculture and Stock, whose decision, subject to the right of appeal to the Minister, shall be final.

7. All cotton must be grown from seed obtained through the Department of Agriculture and Stock.

The advance mentioned in No. 1 is a minimum advance and any profit accruing after deducting the cost of ginning and marketing, will be divided *pro rata* amongst those who supplied the seed cotton.

Season ending 31st July, 1924.

1. Good quality cotton is defined as being seed cotton of good quality, free from disease and from the following defects:—That it is not ratoon cotton; is clean, properly packed, and not immature, stained, dirty, or otherwise damaged.

2. The term "ratoon cotton" is applied to the second or any subsequent growth made by plants which have already been raised from seed, irrespective of whether such plants have borne a crop or not.

3. Seed cotton is cotton in the seed from annual plantings.

4. An advance will be made for cotton of good quality, free from disease and defects:—

(a) To growers of seed cotton of $1\frac{1}{4}$ -inch staple— $5\frac{1}{2}$ d. a lb.

(b) To growers of seed cotton of less than $1\frac{1}{4}$ -inch staple— $4\frac{1}{2}$ d. a lb.

delivered at the nearest ginnery, or as may otherwise be arranged by the Department of Agriculture and Stock; but no advance will be paid to any grower for the product of more than 50 acres in any one season.

5. Any grower having a greater area of seed cotton than 50 acres can send his cotton from the area exceeding 50 acres for which advances are made, to the ginnery for ginning and marketing on owner's account and risk. Every grower of more than 50 acres of seed cotton must notify the manager of the ginnery and furnish him with full particulars of the excess quantity; failure to give information may jeopardise an advance on the first 50 acres.

6. The advances mentioned in No. 4 are minimum advances, and any profits occurring, after deducting the cost of ginning and marketing, will be divided *pro rata* amongst those who supplied seed cotton.

7. No ratoon cotton will be received at the gins.

8. Seed cotton delivered at the ginnery that is found to be of bad quality and not free from disease or defects as mentioned in condition No. 1, may be precluded from any advance, may be classed at a lesser value than the full advance, or treated on the owner's account as the Minister may decide.

9. All grading and inspection of cotton at ginneries, subject to an advance, will be under the supervision and direction of officers of the Department of Agriculture and Stock, whose decision, subject to the right of an appeal to the Minister, shall be final.

10. All cotton must be grown from seed obtained through the Department of Agriculture and Stock.

NOTE.—The rates and conditions of advances for the years 1925 and 1926 have yet to be determined.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS,
Assistant Botanist.

No. 15.

THE HAUER (*Dissilaria baloghioides*).

The Hauer is a very well-known tree in the "scrubs" (rain forests) of the North Coast line, where it is also known as Lancewood, Redheart, and Blackheart. The wood is very hard and somewhat flint-like, qualities which suggested the name Lancewood. It is much more durable than most of the scrub timbers and has been used for fencing posts. In general appearance, many of the trees somewhat resemble the Marara (*Weinmannia lachnocarpa*), but they are mostly smaller and the heartwood darker. The Hauer abounds in the Queensland coastal scrubs from Brisbane to Proserpine. There are a few trees of the species in Bancroft Park, Kelvin Grove. Most of the trees known to the authors are tall and slender, and rarely exceed 2 feet in barrel diameter. The bark is dark-brown, almost smooth, and often shed in thin flakes or strips; when cut it is seen to be red and measures $\frac{1}{8}$ inch in thickness on a tree with a barrel diameter of 1 foot-9 inches.



Photo. by the Authors.]

PLATE 83.—THE HAUER (*Dissiliaria baloghioides*).
A specimen in the Kin Kin scrub.

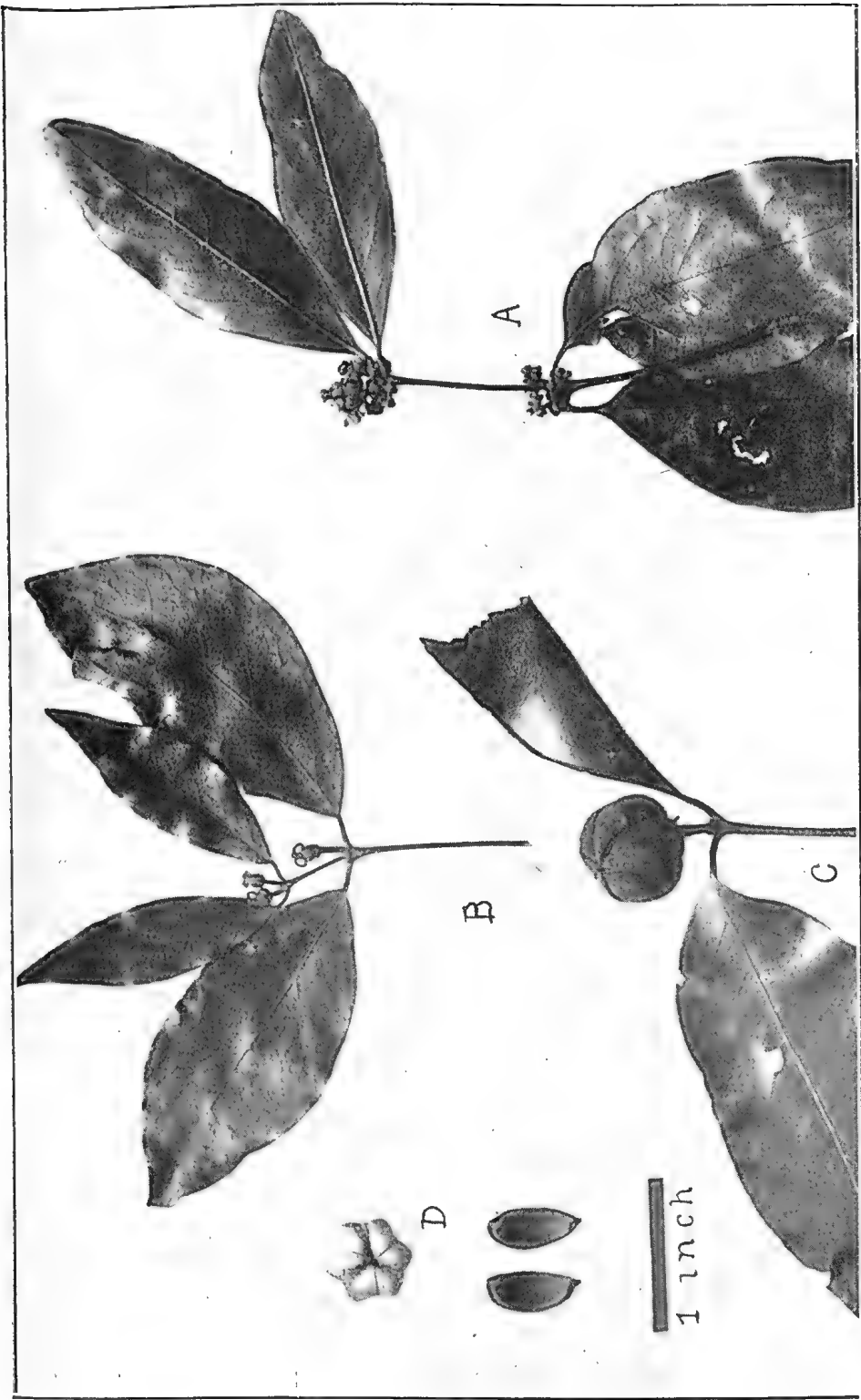


PLATE 84.—THE HAUER.
Showing, A male flowers, B female flowers, C capsule, D capsule with outer covering removed.

Photo : Dept. Agriculture and Stock.]

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS FOR SEPTEMBER, 1922.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%.	lb.	
Bellona	Ayrshire ...	30 Aug., 1922	1,020	4.0	57.70	
Confidence	" ...	13 Aug., "	780	4.0	36.30	
Thyra of Myrtle-vi-w	" ...	22 Aug., "	810	3.5	33.00	
Hedges Natt e ...	Friesian ...	20 May, "	690	3.8	30.90	
Songstress	Ayrshire ...	4 July, "	660	3.7	28.50	
Miss Fearless ...	" ...	30 May, "	600	4.0	27.90	
Dawn of Wairagahurra	Jersey ...	17 May, "	510	4.7	27.90	
Yarraview Slow-drip	Guernsey ...	1 Sep., "	540	4.4	27.90	
Pretty Maid of Haremar	Ayrshire ...	11 Sept., "	540	4.4	27.90	
Magnet's Leda ...	Jersey ...	8 Feb., "	510	4.5	27.00	
College Child Iron	" ...	25 Jan., "	420	5.4	26.70	
Dear Lassie	Ayrshire ...	19 June, "	600	3.6	25.20	
Miss Betty	Jersey ...	17 May, "	450	4.6	24.30	
Prim	Friesian ...	6 Feb., "	630	3.3	24.30	
Snowflake	Shorthorn ...	20 Feb., "	540	3.8	24.00	
College Cobalt ...	Jersey ...	3 April, "	420	4.6	22.50	
College Ma Petite	" ...	5 Feb., "	420	4.5	22.20	
Netherton Belle ...	Ayrshire ...	19 July, "	480	3.9	21.90	
Fair Lassie	" ...	1 Sept., "	600	3.0	20.70	
La Hurette Hope ...	Jersey ...	30 June, "	420	4.2	20.70	
College La Cigale	" ...	10 July, "	420	4.1	20.10	

Rainfall for the Month, 96 points.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

By C. T. WHITE, Government Botanist.

No. 27.

TUMBLING MUSTARD OR ORIENTAL ROCKET (*Sisymbrium orientale*).

Description.—An erect branching annual or biennial herb about 1 to 3 feet high. Stems smooth or clothed with a few hairs. Leaves glabrous or more commonly thinly clothed with longish hairs tapering at the base into long slender stalks; lower leaves deeply lobed, the terminal lobe the largest; uppermost leaves narrow-lanceolate, entire (not lobed or toothed). Flowers small, yellow; seed pods very slender, straight or more or less curved, 3 to 4 inches long, slightly hairy; seeds very numerous, small (about $\frac{1}{4}$ line long), oval with a U-shaped furrow on one side, light brown in colour.

Distribution.—A native of Southern and Central Europe; now a naturalised weed in many countries.

Botanical Name.—*Sisymbrium*, from the Greek word *sisymbbron*, the name of some sweet-smelling plant, probably mint or thyme; *orientale* (Latin) meaning eastern, no doubt, from the plant extending to Eastern Europe and Western Asia.

Properties.—Not known to possess any economic properties. It is not harmful in any way, but, like other plants of the family Cruciferae, would, no doubt, give a turnip-like taint to the milk of cows feeding on it to any extent.

Eradication.—So far as observed in Queensland, the "Tumbling Mustard," though fairly common, is not very aggressive; and beyond hand pulling or hoeing, calls for no special methods of eradication. Its smooth leaves and stems militate against the use of sprays. Though occasionally found in northern parts, it is more abundant in the cooler parts of the State.

Botanical References.—*Sisymbrium orientale*, Linn. Cent. Plant. 11, 24; Jacq. Fl. Austr. IV. 12.

This weed was referred by the late F. M. Bailey ("Queensland Agricultural Journal," Vol. XXI, 1908, p. 292) to *S. Irio*, but seems to agree better with the plant described above. It is also very similar to *S. altissimum*, a common weed in Canada and the United States, only differing in one or two minor characters.



Photo : Dept. Agriculture and Stock.]

PLATE 85.—TUMBLING MUSTARD, OR ORIENTAL ROCKET (*Sisymbrium orientale*).

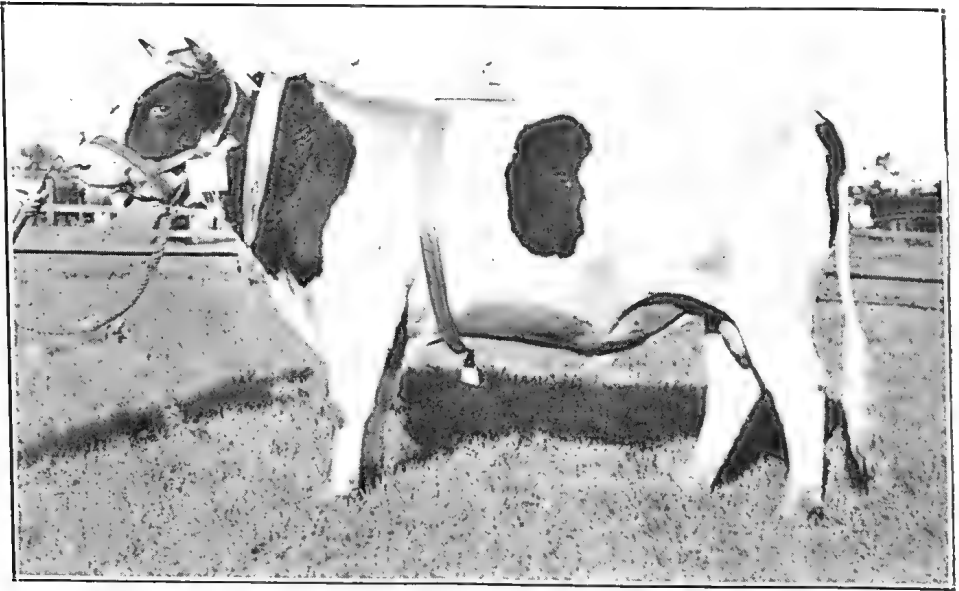


PLATE 86.—BELL DE KOL ONGARRIE (IMP., N.Z.)

A direct descendant of the World's Champion Friesian Cow, Westmere Princess Pietertge, the gainer of an official record of 939.78 lb. butter in one year. The property of Mr. P. P. Falt, Ryfield Friesian Stud, Tingoorra.

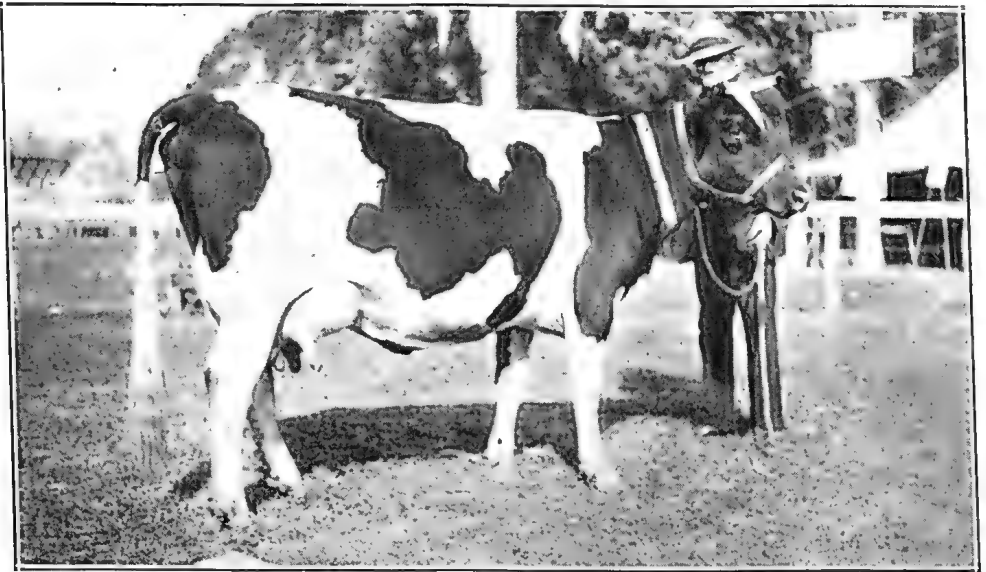


PLATE 87.—OAKLEA NOREEN (IMP., NO. 251).

A cow with an official record of 62 lb. milk, 3.80 lb. butter in 24 hours. Winner of nine Home Milking Competitions against all breeds, also winner of Royal National Home Milking Competition, 1921. She holds the production record for Queensland over all cows of all breeds at her age, 4 years 2 months o'd. The property of Mr. P. P. Falt.

THE SOLAR ECLIPSE.

GEOLOGICAL SIGNIFICANCE OF SOLAR PHENOMENA—IS A DROUGHT LOOMING?—THE JENSEN THEORY OF INTER-RELATIONSHIP.

The recent total eclipse of the sun clearly demonstrated that we are approaching a sunspot minimum, which, in its turn, raises the question whether the earth's climate and such phenomena as earthquakes, volcanic eruptions, and droughts are influenced or not by sunspot conditions. It will be interesting, in the circumstances, to see if the coming year—1923—which will be a year of sunspot minimum, will be accompanied, so far as Australia is concerned, with drought conditions and by volcanic eruptions and earthquakes in other parts of the world.

SUNSPOTS AND TERRESTRIAL DISTURBANCES.

Dr. H. I. Jensen (Queensland Geological Survey) has advanced the theory of the inter-relation between sunspots and terrestrial disturbances. Sir Edgeworth David, commenting on this theory in the Sydney "Daily Telegraph" of 16th January, 1907, expressed the opinion that it was "one of the most reasonable yet put forward, as Jensen had quoted an immense amount of evidence to show that there was a distinct inter-relation between sunspots on the one hand and volcanic and seismic phenomena on the other."

According to the Jensen theory, during the sunspot minimum, earth temperature is probably also at a minimum, and consequently heat is then being radiated outwards into space more rapidly than at other times, thereby intensifying the contraction and fracturing of the earth's crust, both of which processes are, no doubt, very important factors in producing earthquakes and volcanic eruptions. At the same time, as there is a close relation between earth magnetism and sunspots, it is possible that variations in earth magnetism depending for their periodicity on the sunspot period, or half period, may also be a determining factor.

SUNSPOT MINIMUM AND DROUGHTS.

It has been proved that in years of minimum sunspot intensity Queensland experiences scorchingly hot summers, and every part has cold winters for its latitude. In New South Wales the summers are hot, with frequent north-west winds, relieved at times by "southerly busters"; the winters are cold and rather protracted, but as the atmosphere is dry, the cold is not felt as much as in the wet winters accompanying a sunspot maximum, and the nights are not rendered unpleasant by rain, fog, or snow. In years of minimum sunspot intensity, the Central Australian cyclonic area in summer is of comparatively small dimensions, and consequently the outward-blowing hot winds reach the surface of the earth in the coastal districts, giving (for instance, Sydney) frequent north-west winds. In winter this area is covered by a vast permanent anti-cyclone, from which the cold, dry, westerly winds originate. The anti-cyclone belt is greatly widened, and the rain-bringing monsoonal and antarctic V disturbances are consequently not frequent.

It is no mere coincidence that the years 1811-12, 1844-46, 1864-69, and 1896-1902 were years of drought in the greater part of the world, and at the same time periods of sunspot minimum. Nor does it seem a coincidence that 1864, 1870-72, 1893-4—periods of sunspot maximum—were wet years over the greater part of the earth's surface.—"Queensland Government Mining Journal."

KUDZU.

A REMARKABLE FODDER PLANT—A QUEENSLAND FARMER'S OBSERVATIONS.

Impressed by glowing accounts of Kudzu as a fodder plant, Mr. Hugh McMartin, of Pullen Vale, Indooroopilly, obtained some roots for local experiment. Of the results of this experiment Mr. McMartin writes:—

It is now a little over a year since the Kudzu Fodder Vine was introduced to Queensland and the first roots set on my farm at Pullen Vale, but such has been the headway made by the plant that even in this short period sufficient has been learnt of its characteristics and habits to give one a fair idea of its possibilities under local conditions. The reputation earned by Kudzu in Florida, U.S.A., is so remarkable that one may be pardoned for being at least a little sceptical as to the truth of the claims made for it by enthusiastic growers in the United States, but the writer has had ample evidence to prove that Kudzu will show results here almost, if not quite equal, to those obtained overseas.

In the first place Kudzu is an exceptionally rapid grower, and I have observed the main runners to advance at the rate of eight to nine inches during twenty-four hours in damp, warm weather. It will resist dry weather effects splendidly, as evidenced by the fact that although we have had little beneficial rain for over seven months my Kudzu vines are a mass of succulent, dark green leaves and the runners are growing several inches a day.

Kudzu, being a deep-rooter, can obtain a plentiful supply of moisture from the soil and subsoil while the average of our grasses and shrubs are perishing.

I have tested the plant under the most severe conditions of heat, drought, and frost, and it has come through them all remarkably well.

Such great growth progress has Kudzu made here that I have even been able to carry out a few small experiments in stock feeding with it, and once more the result has been most gratifying. During the very dry winter the Kudzu patch was fed down several times with sheep, and on each occasion, despite the absence of rain, no sooner were the animals removed than the plant began to send out fresh shoots. I was also agreeably surprised to observe that sheep which had become anaemic recovered remarkably when fed on Kudzu.

My Kudzu vines have given no evidence of a desire to seed, propagation being from the roots that strike into the ground from the nodes on the main runners.

An American claim for Kudzu is that it will carry six milking cows to the acre when grown on trellises about 12 feet apart; also that as much as 10 tons of fodder per acre may be obtained from it. Judging by its performances here to date, I see no reason to discredit these claims. Once stock begin eating Kudzu they soon become exceedingly fond of it, and the grower will be well advised to keep the fences surrounding his Kudzu patch quite stock proof. Wild creatures such as hares, wallabies, and bandicoots also evince a keen desire to investigate the Kudzu vines, and will take most unusual risks to feed upon it.

In order to obtain a satisfactory "strike" Kudzu roots should be planted in damp soil and watered every few days for about a fortnight. Once started the plant looks after itself.

It seems highly unlikely that Kudzu can ever become a pest in any way. Its leaves are soft and juicy, like other legumes, and, of course, it is quite unprotected by thorns.



PLATE 88.—IN A DAWSON VALLEY GARDEN. A MINISTERIAL VISIT TO CRACOW STATION.

From the Right: THE PREMIER HON. E. G. THEODORE, MR. F. M. FORDE, M.L.A.; HON. JAMES STOPFORD, —, HON. J. LARCOMBE.

Event and Comment.

Saving an Industry—Proposed Arrowroot Pool.

The arrowroot industry is threatened with extinction. With stocks on hand equalling about two years' normal consumption, and lacking selling organisation, the growers are helpless. The price they are receiving for their labour is below the cost of production and bears no relation to the price paid for arrowroot by the consumer. Adversity has brought growers and manufacturers together, and on 20th September last, a deputation comprising arrowroot growers waited upon the Wheat and General Agriculture Committee of the Council of Agriculture with the object of explaining the present position of the industry in Queensland, and urging upon members the need for an arrowroot pool. The Committee sympathised with the request, and deputed the Director (Mr. L. R. Macgregor) to visit localities where the crop is grown and obtain first-hand information respecting the condition of the industry. Subsequently, at Beenleigh, he addressed what is said to have been one of the largest meetings of primary producers ever held at that centre. The growers were shown how the principle of co-operation applied to their industry would tend to eliminate speculators and operate in the direction of a more stabilised market. He stressed the fact that co-operation rests upon the common economic interests of men engaged in the same pursuit, and unfolded a marketing plan which promised to save the arrowroot industry.

At the last meeting of the Council of Agriculture, a deputation of those engaged in the industry attended and presented a petition signed by growers present at the Beenleigh meeting, asking the Council to recommend to the Government the constitution of a pool. The deputation urged that immediate action be taken to institute the pool, as the planting season is now almost completed and it is urgently necessary to reassure the planters.

The matter was considered by the Council, and it was decided to recommend the immediate establishment of a pool in accordance with the provisions of the Primary Products Pools Act of 1922. The Premier (Hon. E. G. Theodore), to whom the circumstances of the industry were explained by Mr. Macgregor, has taken prompt action, and it is understood that an Order in Council has been approved notifying the intention of the Governor in Council to declare arrowroot a commodity under the Primary Products Pools Act.

The Director pointed out that the institution of a pool will not involve Government control of the product. The Pools Act was not designed for that purpose. In fact, the Act specifically lays down that boards administering pools will not represent the Crown for any purpose whatsoever. It is provided that, when a pool is constituted under the Act, representatives of growers shall be appointed to administer and control the affairs of the pool.

The marketing plan drawn up by Mr. Macgregor is not a hard and fast set of rules, but merely sets out certain suggestions for the guidance of the representatives of growers. Provision is made for creating a local demand for the product, the qualities of which are little known to the public. Judicious publicity to stimulate this demand is recommended, and if this policy be given effect to, the existing stocks can most readily be cleared before next season.

Growers of arrowroot and those millers who have invested capital in plant and machinery will now be considerably relieved. They will view the future with more confidence, and before the planting season closes will, no doubt, plant the full area of land they have available with excellent prospects of a reasonable return.

An Experiment in Lamb-raising—Kudzu Leaves and Sweet Potatoes.

An experiment in lamb-raising which should be of much interest to Queensland coastal stockowners is being carried out by Mrs. Hugh McMartin, of Pullen Vale, Inndooroopilly. Taking three Dorset Horn ewes with young lambs at foot, about two months ago, Mrs. McMartin began feeding the mothers with a diet of which the principal items were leaves of the Kudzu fodder vine and sweet potatoes. Almost at once a remarkable change for the better was shown in the condition of both ewes and lambs, giving the observer the impression that the mothers' milk flow had improved both in quantity and quality. When the youngest lamb was

fifty days old they were weighed. One ram lamb, fifty days old, scaled 53 lb.; another ram lamb, fifty-five days old, weighed 54 lb.; and a ewe lamb, fifty-nine days old, 54 lb.

Both ewes and lambs appeared to relish the unusual diet exceedingly, and every particle of their Kudzu-potato meals is greedily devoured. The lambs are to be weighed again when the youngest is seventy-five days old.

Profitable Lambs—An Interesting Test.

For the purpose of comparing the relative advantages of using Dorset Horn and Corriedale rams on first cross ewes to raise lambs for sale in the sucker stage, a test is being conducted at the Wagga Experiment Farm, where 400 Border Leicester Merino cross ewes were mated with Dorset Horn rams and a similar number with Corriedales. The first sucker lambs of the two series to be ready for market—being about four and a-half months old—were sold recently at public auction with the result that the Dorset Horn cross lambs averaged 21s. 7½d. per head and the Corriedale cross averaged 19s. 8½d. The New South Wales departmental Sheep and Wool Expert (Mr. F. B. Hinton), in reporting the result of the sale, mentioned that the Dorset Horn suckers were much admired and were more fancied by the export buyers than the others.

“Bunchy Top” in Bananas.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) is closely interested in the developments relating to a reported discovery of a means of defeating the “bunchy top” disease on border plantations and the department is well informed as to the progress of experiments and tests being carried out by the trans-border authorities and others interested, including Mr. Marks, of Terranora, Tweed River. So far, only a small measure of success has attended official tests and experiments and this fits in with the experience of the Fijian authorities. In Fiji, where it is known as “strangles,” “bunchy top” is said to have existed there for forty years.

To check the spread of the disease, the New South Wales agricultural and fruit authorities, in addition to experiments and tests and dipping and manurial investigations, have prohibited the removal of banana suckers from certain of the Northern Rivers areas.

The affected region reaches down towards Byron Bay, and the Brunswick River is now affected. The Richmond River area is clean. Plants may not be taken south of a line drawn from east to west south of the Brunswick. Great care is also being taken in respect of the introduction of plants from Queensland. No plants may be taken there from Queensland unless the Government banana expert, inspector, and instructor (Mr. Reg. G. Bartlett), of the New South Wales Department, has first inspected the Queensland plantations from which it is proposed to purchase the suckers, and also unless they have been inspected by him when they reach the border at the Tweed.

“Bunchy Top” or “Choke Throat.”

In the course of a recent Press interview, Mr. Bartlett said that, despite reports to the contrary, he believed that there was no “bunchy top” in Queensland north of Nerang. Many growers confused “bunchy top” with what was known as “choke throat”—a form of growth which had been very prevalent in both New South Wales and Queensland. It was simply due to the adverse seasonal conditions—the dry weather—ruling about six months ago, which caused the throat of the banana to contract at the top, and the bunch was thus unable to emerge. However, growth took place from the bottom, and the stem was pushed round, sometimes in a circle and sometimes into an “N” shape. Thus it was sometimes referred to as “goose neck.”

Mr. Bartlett pointed out that a similar trouble was experienced in Queensland seven or eight years ago in one of the best of spring seasons so far as rainfall went, but it followed an extremely dry autumn and hard winter.

Notwithstanding the inroads of “bunchy top,” the production of bananas in New South Wales had materially increased. This was due to the fact that new areas had been, and were being, brought under bearing. Nevertheless, many growers were being forced out of the industry. So far the only remedy seemed to be to cut out the plants.

Mr. Marks, of Terranora, who was carrying out further tests with his remedy for "bunchy top," was very optimistic of the result. So optimistic was he that in an arrangement with a growers' organisation for tests over a stated period, and for which, if successful, he was to receive a substantial reward, he refused an offer that he should be required to demonstrate only 95 per cent. free over a period of two years, and claimed that he could demonstrate 100 per cent. free. The results of the test were being awaited with the utmost interest. The Government intended to run parallel experiments to test Mr. Marks' theory and treatment.

Co-operative Marketing.

The benefits of co-operative marketing are now being recognised by primary producers all over the world, and Queensland farmers have already experienced something of the advantages accruing from practical applications of this principle. Much good, solid spade work has already been done on the commercial side by existing co-operative companies, and to them is due the credit that should be accorded the pioneers in any forward movement. In some directions, however, particularly in the matter of marketing, it has been found that separate co-operative units operating independently cannot protect fully the interests of primary producers. Modern marketing economy, therefore, demands unity of effort by instituting methods of compulsory co-operative marketing, which have become to be known as "pools." War-time experience demonstrated the advantages of this form of co-operation by—(1) eliminating unnecessary cost as between grower and consumer; (2) blocking unnecessary competition between growers to the benefit of unnecessary middlemen; (3) stabilising prices; and (4) facilitating the financing of marketing and other operations. So manifest were the advantages through war-time pools that a large volume of opinion among the producers of the Commonwealth is now definitely and strongly in favour of the perpetuation of the pooling principle.

Procedure in Instituting a Pool.

On the recommendation of the Council of Agriculture, the Minister may, by notice in the "Gazette," notify the intention to make an order instituting a pool in thirty days from the date of "Gazette" notice. The board of representatives of growers, when appointed by Order in Council, would then proceed to make arrangements for the receiving, financing, and marketing of the commodity, and would be responsible to account to the growers for the proceeds. All of the particular commodity being pooled, grown in the State, unless by specific exemption, would, upon the constitution of a pool, be marketed by compulsory co-operation for the benefit of the growers by the board of growers' representatives.

Within thirty days after the publication of the first notice of the proposal to make an order to constitute a pool, if fifty or more growers in the district concerned petition the Minister to take a poll before the order is made, the Minister shall take a vote of the growers of the product on the question, and if less than three-fourths of the votes are polled in favour of the pool, the order to constitute a pool shall not be made. "*The Primary Products Pools Act of 1922*" was designed for the benefit of the producers of our main primary products. It is a measure planned in the interests of producers, and providing for control by producers of the products of their own industry.

The Need for Pooling Legislation.

Pools constituted during war time had the protection of the War Precautions Acts and kindred legislation, whereby the boards charged with the administration of these pools were clothed with adequate powers to complete financial and all other arrangements, to enter into legal contracts, to sue and to be sued, and generally to carry out the work entrusted to them on behalf of the producers. Voluntary pools not protected by legislation have experienced difficulties in all of these respects. By legal decisions in Commonwealth Courts of Law, notably in the instance of the Port Huon (Tasmania) fruitgrowers' action, and in the Victorian oniongrowers' case, contracts made by voluntary pools have been judicially set aside, and the objects for which such pools were constituted have been nullified. Moreover, voluntary pools have found it difficult to afford their pool growers sufficient protection against produce, not in the pool, being used in prejudicing and undermining the arrangements made for the marketing of the pooled product, to the detriment of growers as a whole.

Primary Produce Pools Act.

In order to meet these difficulties and to afford growers a means whereby pools may be given legal status, and to permit of growers' representatives exercising the necessary measure of control for the protection of the producer, the Minister for Agriculture (Hon. W. N. Gillies) introduced a Bill, which subsequently became law, last session, and which is now known as "*The Primary Products Pools Act of 1922.*" The provisions of the Act may be applied to any product of the soil in Queensland, and any dairy produce and any article of commerce prepared other than by process of manufacture from the produce of agriculture, or other rural occupations in the State.

Provision for Genuine Control by Growers' Representatives.

The Act in question is not designed to institute Government control of any commodity. In fact, the Act specifically lays down that boards administering pools will not represent the Crown for any purpose whatsoever. It is provided that when a pool is constituted under the Act, representatives of growers shall be appointed to administer and control the affairs of the pool. The Act provides for no Government representation whatever, but the Legislature, with a view to protecting the rights of every producer interested in a pool, has stipulated that the Auditor-General shall exercise an oversight over the financial transactions of every pool and audit its accounts, and that in this connection also the Act provides that a statement of accounts shall be exhibited as may be prescribed by the Governor in Council. This is a precaution which every producer will readily endorse.

How Pools may be Formed.

The Act provides that a pool may be declared by Order in Council upon the recommendation to the Government by the Council of Agriculture. The case for the institution of the pool should be clearly set out. An estimate of the quantity produced, with information respecting localities of production, and, if possible, the cost of production, should be supplied, as well as an outline of the difficulties hitherto met with by growers in marketing the commodity in question. Finance is an important question confronting any proposed pool. The policy of the Federal Government in regard to a Commonwealth Fruit Pool, as enunciated recently, should serve as a guide to any pool in making their financial arrangements. The Commonwealth clearly laid it down that the credit of Australia (through the Commonwealth Bank) would be granted to a Fruit Pool provided that the Government was satisfied that the administration of the pool was in the hands of an efficient organisation which would protect the industry and the producers engaged in it, handle marketing problems, open up new markets, and generally advance Australia's interests by increasing production and export trade. As any Queensland Pool Board will necessarily have to arrange for finance (as provided in the Act) no doubt any financial institution if approached will also require to be similarly satisfied in this regard, and in any representations to the Council for the formation of a pool, full particulars of the proposed arrangements in regard to finance should also be submitted for the Council's guidance. The information required is somewhat analogous to that contained in the clause usually found in a prospectus outlining the satisfactory financial arrangements made with the vendors in regard to assets vital to the formation and carrying on of the business of a proposed company. Complete information must be prepared to enable the Council of Agriculture to arrive at a decision and to justify it in making the necessary recommendation to the Government.

Crossbred Wheat on Cecil Plains.

When the Cotton Delegation visited the Cecil Plains Soldiers' Settlement on the Darling Downs, its members were shown a splendid crop of wheat of the crossbred type. Captain Binnie, the supervisor of the settlement, had been inclined to plant a fairly large area with the Florence variety, but the State Director of Agriculture (Mr. H. C. Quodling) pressed him to sow crossbred wheat. He did so, and the good results obtained were readily apparent. While the Florence had failed in this particular instance, the crossbred type had thrived well, and at the time of inspection presented a very healthy appearance. Captain Binnie estimated that a four to five bag crop would be the result from the crossbred wheat—and nothing from the Florence variety. Usually Florence wheat is among the most prolific on the Downs, but it had failed under the conditions prevailing at Cecil Plains.

Don'ts for Cotton Planters.

Among recent callers to this Office was Mr. J. G. Powell, a cotton planter from the State of Georgia, U.S.A., who has been engaged by the Australian Cotton Growers' Association as an instructor in cotton culture. Mr. Powell has already seen something of Queensland cotton fields and noted the methods adopted by new growers. This has caused him to stress the following don'ts which are based on his own experience:—

1. Don't plant your cotton until the land is thoroughly prepared.
2. Don't try to plant cotton seed to proper stand, that is, correct spacing between stalks. Cotton growers have been experimenting on this for hundreds of years, and have not solved it yet. You are wasting time and labour instead of saving it. Plant thickly and cut down to proper stand with hoe when plants are 4 inches to 6 inches high.
3. Don't let weeds and grass get started; cultivate often, when shallow cultivating will suffice.
4. Don't plough or harrow deeply close to the drill, especially when the plants are in the more advanced stage.
5. Don't forget to replant by hand all missing spaces along the row as soon as possible.
6. Don't forget that the more fertile your land the thicker to leave the plants, but in no case less than 12 inches apart.
7. Don't have rows more than 4 feet apart. In most fertile land plant closer than in poorer soil.
8. Don't fail to keep your rows as near as possible a uniform width, this will aid you materially in cultivation.
9. Don't let soil form a hard crust after planting; break it as light as possible, preferably with spring tooth harrow.
10. Don't forget that proper planting and afterwards chipping down to proper stand, will produce a stalk of proper size, both for producing cotton and to assist materially in picking.

Revelation and Education.

In the course of a letter to the Premier (Hon. E. G. Theodore) Mr. R. Harding, Secretary to the Cotton Delegation, commented very interestingly on Queensland and her cotton future. He writes:—"May I offer you my sincerest thanks for the most interesting case of cotton samples which you have so very kindly sent me. Our tour through your State has been a revelation and a great education to me. I could not have believed the unbounded possibilities of Queensland unless I had been permitted to see them as we have. As the years go by and the cotton industry here expands until it rivals and surpasses the wool industry of Australia, an added interest and value will attach themselves to your gift and serve to remind me of the whole-hearted support and enthusiasm which you gave to that industry when it was in its birth."

The Dairy Industry—Reported Neglect of Cheese.

Speaking recently on a report furnished to the Agent-General by a London butter expert containing an allegation that Queensland was devoting undue attention to butter to the neglect of cheese, the Minister for Agriculture (Hon. W. N. Gillies) said that he would like to emphasise that Queensland, rather than neglecting cheese production as alleged, was the principal producer of cheese in the Commonwealth, and under normal conditions the cheese factories here manufactured more cheese than did any of the other States, while as far as the export trade was concerned 75 per cent. or more of the total complement of cheese exported each year from Australia had been of Queensland origin. Consequently it could not be rightly said that this State was responsible for neglect of the cheese branch of the dairying industry.

Mr. Gillies pointed out that the respective market quotations for butter and cheese fluctuated considerably, and on occasion it happened that the preference in the market value was in favour of butter, and in such instances the dairymen were inclined to supply cream to a butter factory rather than to supply milk to a cheese factory, and in this way the output of cheese was affected from time to time. To a limited extent this influence had been operative recently, but the chief factor causing a temporary reduction in the volume of the cheese output was the absence of rain in the dairy districts, causing an appreciable reduction in the quantity of milk supplied to the cheese factories. Immediately the weather broke the production of cheese would increase, provided that the price offering was considered satisfactory to producers.

Production, Prospects, and Prices.

The information set out hereunder has been abstracted from departmental summaries of market movements and weather conditions for the month of October.

Agriculture.

The first week of the term was rainless and the wheat outlook was growing more dismal. In localities where somewhat heavier rain had fallen in the early growing period wheat crops, though short and poorly developed, were just about holding their own. On the early planted and well-prepared lands the best crops were seen. Much of the growth was being fed off by dairy stock. Cotton was maintaining popular interest, and many plots were being prepared. The market was affected by the dry spell and prices firmed.

The second week saw a prospect of total grain failure in many wheat areas. Not an acre was freshened by a splash of the needed. There was still a prospect of a light crop where the most careful cultural operations had been carried out if rain followed soon. In the Inglewood district stock losses were reported. Early sown maize and potatoes, although looking well, were badly in need of a shower. Large areas of land were waiting for weather improvement to receive sowings of maize and cotton. All lines were in strong market demand.

Very useful and widespread rains were the most encouraging feature of the week ended 21st October, the third period of the month under review. Up to nearly 4 inches were registered in the agricultural areas. In localities on the wheat belt where crops were not beyond recovery, prospects brightened. Maize and other crops revived to a large extent. On the coast the rainfall was scattered and generally light, but pastures were refreshed to the extent of appreciably improving the cream yield.

Further beneficial rain fell in the course of the last week of the period under review throughout practically the whole of Southern Queensland. On the Darling Downs were registered the heaviest falls. Maize and cotton were being sown in large areas and generally the immediate outlook had improved vastly.

The Markets.

Product.	Week ended 7th October.	Week ended 14th October.	Week ended 21st October.	Week ended 28th October.
Lucerne chaff	Prime to 13s. 6d.; Inferior to 4s. 1d.	5s. to 12s.; Other lines held at 4s. 3d. to 11s. 3d.	5s. 3d. to 10s. ..	5s. to 9s. 3d.
Oaten ..	Border, prime to 10s.; Local, 4s. 3d. to 5s. 6d.	7s. 6d. to 10s. 3d.; Local to 6s. 10d.	7s. to 9s. 9d. ..	9s. 6d.; Local 6s. to 8s. 2d.
Mixed ..	6s. 7d. to 8s. 6d.	5s. 9d. to 8s. ..	5s. to 9s. ..	5s. 9d. to 8s. 10d.
Maize ..	Prime to 5s. 2½d.; Other to 4s. 11d.	5s. 2d. to 5s. 4d.	Unchanged ..	5s. 1½d. to 5s. 4d.
Potatoes ..	Prime to 17s. 9d.	To 19s. 2d. ..	Prime to 19s. 8d.; Others to 6s. 3d.	9s. 7d. to 16s. 10d.
Sweet potatoes	4s. to 8s. 6d. ..	4s. to 7s. 3d. ..	5s. to 6s. 6d. ..	5s. 6d. to 8s.
Pumpkins ..	4s. to 6s. 2d. ..	3s. 6d. to 6s. 3d.	2s. to 6s. 1d. ..	4s. to 7s. 9d.
Wheat (feed) ..	5s. 8d., passed	5s. 6d. to 6s. 3d.	5s. 6d. to 6s. 6d.	5s. 10d. to 6s. 5d.
Broom millet ..	Prime hurl, £50	£40 to £50 ..	Unchanged ..	Unchanged
Barley ..	Market bare ..	Unchanged ..	4s. 7d. ..	..

Live Stock.

ENOGGERA MARKETS (1st November).—At the Enoggera live stock markets on Wednesday, 1st November, 7,670 sheep were penned. With the exception of about 2,000 sheep from the Central district, which were in only store condition, the quality of the yarding was satisfactory, there being a large number of small drafts of good to prime sheep from the Darling Downs. There was a large attendance of butchers, including many from the country, and competition for good to prime sheep was brisk and well sustained. The market opened to a very strong demand, with prime wether mutton realising 5½d. to 6d. per lb. and continued at about this level throughout, closing sales being equal to the best of the day. A small draft of very prime shorn Merino wethers from the Darling Downs sold to 35s. and averaged 29s. 7d., and other drafts averaged 25s. to 27s. Quotations:—Three-quarter to full-woolled and half-woolled Merino wethers, none offering; short-woolled, 18s. to 35s.; half-woolled Merino ewes, 17s. to 23s. 3d.; short-woolled, 11s. to 23s. 3d.; three-quarter to full-woolled crossbred wethers, 33s. 6d. to 37s. 6d.; short-woolled, 19s. to 29s.; full-woolled crossbred ewes, 23s. to 28s.; short-woolled, 15s. to 27s. 6d. Prime heavy lambs, 16s. to 30s. 3d.; good, 11s. to 15s.; light, 7s. 3d. to 10s. 6d.

Of fat cattle about 1,900 head were yarded. The cattle generally were of very good quality, there being a high percentage of good to prime bullocks and a number of drafts of prime cows. There was a very large attendance of buyers, including many from the country. One large buyer operated with freedom and secured about 600 head. The sales opened to a good general demand, with prices on a par with the previous week's rates, but the market became irregular as sales progressed, and prices showed a weakening tendency, closing rates showing a distinct decline on those at the opening sales. Prime bullock beef realised 20s., with occasional pens at 22s. per 100 lb., at the opening sales, but closing rates were 18s. to 19s. Cow beef was worth 17s. to 19s., with odd pens to 20s. A small draft of prime bullocks and cows from Cheepie were sold, the bullocks averaging £9 3s., and the cows £6 a head. Quotations:—Prime heavy bullocks to £11 2s. 6d.; prime, £7 to £8; good, £6 to £7; light, £4 10s. to £5 15s.; prime heavy cows to £8 10s.; prime, £4 5s. to £5 5s.; good, £3 to £4; light, £2 to £3; vealers and weaners, 6s. to £2 14s.

Fruit and Vegetables.

ROMA STREET (31st October).—Beans, 3s. to 7s. 6d.; peas, 4s. to 10s. per sugar bag; cabbage, 3s. 6d. to 10s.; pumpkins, 4s. to 8s.; marrows, 2s. to 3s. 6d.; cucumbers, 9d. to 2s. per dozen; smallgoods, 1s. to 2s. a dozen bunches; tomatoes, 3s. 6d. to 8s. per quarter-case; apples, eating 14s. to 16s., cooking 10s. to 15s.; oranges, 10s. to 15s.; mandarins, 5s. to 16s. a case; lemons, 3s. to 4s.; passion fruit, 8s. to 11s. 6d.; papaws, 2s. to 3s. 6d. per quarter-case; bananas, 2d. to 9d. a dozen; pineapples, 2s. 6d. to 8s. a dozen, odd choice lots to 10s.; eggs, guaranteed special, 11d. to 1s. a dozen.

CERTIFICATE OF SOUNDNESS.

A Certificate of Soundness was issued for the underlisted stallion in the courset of the month of October, 1922.

Name of Stallion.	Breed.	Period for which Certificate issued.	Owner's Name.	Owner's Address.
Baron Kilvie	Clydesdale ..	12 months	J. H. Kilvington	Glenore Grove, Forest Hill

General Notes.

The Pig that Pays.

There is great temptation when times are bad in the special line of farming or stock-raising you have taken up to change over to another line, provided climate and other conditions are suitable; but experience teaches that by far the safest method is to go in for one definite branch as a foundation and to stick to it consistently, however you may vary your side lines. That is the advice of one of the biggest pig-breeders in Illinois, who has seen many ups and downs in the industry, but has always found that, provided the foundation stock are good, the swing back of the pendulum from bad to good seasons will always bring sufficient profit with it and more than counterbalance the lean times. He believes in Poland-Chinas, which also do very well in this country. As he credits his system of feeding with much of his success it may be worth while to briefly summarise it here.

The sows are bred for early spring farrow. As farrowing time approaches they are housed to accustom them to their surroundings, so that they will be quiet and contented when the pigs come. Their ration consists of ground lucerne or soybean hay, with a slop made of boiling water and ground corn. After farrowing, the same ration is continued, with an extra portion of ground lucerne to keep the bowels free. A little ground oats and barley is added to the slop to increase the milk-flow. While the pigs are young the sows are separated from them, and fed and watered on a floor. They also get exercise in this manner. When they return to the pens the pigs suck, the sows are quiet and contented, and there is less likelihood of their stepping on the youngsters than where they are fed amongst their litters. This system also helps to keep the animals and pens clean, and does much to keep the sows in good health.

When the pigs are old enough to eat, they are provided with separate pens and fed a slop made of ground oats or barley, boiled, and served warm. Oats make bone and muscle, while barley is best for fattening. Later the sows and litters are moved to individual houses in the paddocks and allowed to range at will, with such additional feeds as are necessary for the proper nourishment of the sows and the development of the pigs. Pumpkins are fed in the autumn; indeed, this breeder has found pumpkins so good a feed that he has produced a considerable acreage of them for years, purely for that purpose.

Sex Determination—Miracles that did not Work.

A good deal has appeared in poultry papers recently about a device invented by an American which it was claimed could determine the sex of any animal or egg in the embryo stage. Some of the claims made for it, indeed, were so extraordinary that we refrained from even referring to it previously. Now that it has been tested out by the United States Department of Agriculture, and found to be useless, we feel that it is well to warn farmers to whom it may be offered for sale. It is a long, tubular, plummet-shaped device made of nickel-plated iron and filled with a greenish mixture (calcium carbonate and aluminium salt) and suspended by a fine thread. When held an inch above an egg containing a male germ the stuffed tube was said to swing back and forth like the pendulum of a clock; but if the eggs were of the opposite sex the bob would describe little circles; and in the case of an infertile egg there would be no motion at all.

It was also said to tell the sex of oysters, butterflies, caterpillars, beetles, worms, and even the sex of the animal from which were obtained such products as leather and cheese. Even the criminologist was offered assistance, for it was claimed that the unfailing little detective would tell the sex of the person who shed the blood found on clothing or elsewhere. Unfortunately for those who hoped to make a fortune out of its sale the Department's experts could not get the "miracles" to work. Tests on eggs and other things by a number of persons showed that the instrument was useless. No two persons got the same results with the same eggs, and eggs known to be infertile gave positive indications that they would hatch both pullets and cockerels.

"Blackhead" in Turkeys.

On 17th November of last year the writer received a dead six months' old turkey with a note from the owner requesting a post-mortem examination of the carcass, and stating that, out of a flock of fifty turkeys, six were showing symptoms similar to those which had been evidenced by the dead bird. These symptoms were loss of appetite, progressive dullness, lassitude, and emaciation, and diarrhoea of a striking golden yellow colour. The disease had appeared in the various affected birds at intervals during a period of a fortnight previous to the date mentioned, the outbreak apparently originating in one particular turkey which was still alive, though described by the owner as a "hopeless case." The dead bird, however, had shown obvious signs of illness for only two days before death.

"Blackhead" was suspected, and an examination was immediately made of the dead bird, with the following results:—

The carcass was thin, but not emaciated, the weight being $7\frac{1}{2}$ lb. The comb and skin of the head were not darkened, but this is by no means a constant symptom of the disease. In this case the skin of the head was, if anything, paler than normal. There was considerable evidence of the yellow diarrhoea round the vent.

On the carcass being opened, the liver was seen to be enlarged to almost twice the normal size, and to be covered with greenish yellow patches, some circular, many irregular in shape, while others again were ring-like with a centre of normal liver tissue. These areas extended some distance—about $\frac{1}{2}$ in.—into the liver tissue, and their surfaces were depressed below the normal level of the liver substance. The largest area was approximately the size of a sixpence, the smallest being $\frac{1}{8}$ in. in diameter.

Both caeca were much distended throughout their whole length, their walls were $\frac{1}{4}$ in. thick, and they were filled with cheesy, greyish yellow material.

THE TREATMENT.

The disease was thus definitely demonstrated to be "Blackhead," and it was determined, with regard to the remaining birds, to adopt the Ipecacuanha treatment, as recommended by the Wegeforths (*vide* "National Poultry Journal," 9th September, 1921, p. 165).

The ailing turkeys were strictly isolated, and the fluid extract of ipecacuanha was administered in the proportion of ten drops per bird three times daily for three days; then twice daily for three days, and finally, once a day for the same period. The rest of the flock which had been in contact with the diseased birds were given the powdered ipecacuanha in the proportion of one teaspoonful per twenty turkeys twice weekly in mash, to be continued so long as any sign of disease existed on the premises.

Treatment was commenced on 20th November, and continued until the 29th. A week was then allowed to elapse and treatment again renewed.

EXCELLENT RESULTS.

The results were excellent. From the commencement of the treatment the disease appeared to be checked. The birds did not at once improve, but certainly did not get worse. The weight of the turkey in which the disease originally appeared was, on 29th November, barely 7 lb. After the second nine days' treatment, or rather during that period, all the birds began to improve, and on 12th December the weight of the abovementioned turkey—the "hopeless case"—was $9\frac{1}{2}$ lb. By that time all the birds had apparently recovered, appetite and vitality were restored, weight increased, and the droppings were normal in colour and consistency. No signs of the disease had appeared in the rest of the flock.

The owner was unwilling to send the birds to the Christmas market without first making quite certain that all signs of the ravages of the disease in the internal organs had disappeared; so the originally affected turkey was condemned to suffer for the benefit of science, and was chloroformed on 13th December.

Post-mortem examination showed the internal organs to be perfectly healthy—the liver was normal in size and colour, and the caeca and their contents were also normal. The remaining turkeys were thereafter killed for Christmas, and no sign whatever of the disease was found in the internal organs of any of them.

The writer is aware that cases of "Blackhead" occasionally recover spontaneously, but surely it is too much of a coincidence that six turkeys, each of which had shown signs of disease at different times, should simultaneously show a check in the course of the disease at the commencement of the treatment, and continuous improvement thereafter.

It is interesting to note how soon—within a fortnight or so—the liver and caeca of the originally affected turkey, which were presumably somewhat similar in appearance to those of the dead bird first sent in, returned to their normal condition. It is also noteworthy that in none of the sick birds was the skin of the head darkened.

Up to the date there has been no sign of reappearance of the disease. The owner describes the treatment as "a wonderful cure."

The fly in the ointment is the cost. In the present state of the drug market the cost of the nine days' fluid extract treatment works out at approximately 1s. 4d. per bird, and that of the powdered ipecacuanha preventive treatment at 6d. per twenty birds per week. The treatment is therefore somewhat expensive, but in this instance, at any rate, the results fully justified the expense; and it is well to remember that strict isolation of affected birds will assist greatly in reducing the number of those requiring treatment.—N. Bissett, M.R.C.V.S., in "National Poultry Journal."

The Value of Sheep—Small Flocks on Small Areas.

In the course of a recent communication to the Press, Mr. T. A. Spencer, of Roma, who has had many years' experience of grazing in the Maranoa, writes very interestingly on the subject of sheep grazing on small areas, and stresses strongly our neglect in not exploiting to the full the wool possibilities of Queensland. The following points are taken from Mr. Spencer's contribution:—

The most profitable industry of all, and one that has been proved more suitable than any other in this continent, is the wool industry. In this industry we practically have a monopoly, as no other country in the world can compete with us.

The coastal portion can be left to cotton growing, dairying, and fodder crops, but the West is capable of enormous development. The demand for wool is unlimited, high prices are assured for years owing to the shortage of wool. There are 100,000,000 sheep fewer in the world to-day than there were thirty years ago, and 20,000,000 fewer in Australia. Anyone who reads these figures and is familiar with the industry must realise that unless something is done to alter present conditions there will be a further decrease in our numbers.

We find in the West, on the large holdings, owing to the fly pest, large numbers of sheep in big paddocks, and the dingo pest, that the annual losses are enormous. One station lost 40,000 sheep in one year owing to these conditions, and it is being realised that it is almost impracticable to carry large flocks in big paddocks, especially in timbered country where the carrying capacity is light.

Queensland could Treble Her Flocks.

Queensland to-day should be carrying 60,000,000 sheep instead of about 20,000,000. The losses by flies and dingoes are heavy, the losses from drought are heavy, but they can be overcome to some extent. The remedy against flies and dingoes is smaller paddocks and smaller areas. Men can handle small flocks in small areas with a comparatively light loss. The remedy against drought to a large extent is a better water supply. There are not ten stations in Queensland properly supplied with water. Stock have to travel long distances to water; in a drought they are too weak and in good seasons it is not necessary to go back for feed, consequently half the holdings are never utilised. A hundred boring plants should be going continuously either for artesian or subartesian water, or where the country is unsuitable for either, large tanks or dams should be made. What is a living area in one district will not apply to others, as the further west one goes the larger the area necessary. The Maranoa district at present carries about 250,000 sheep; it ought to carry 500,000. Practically the whole of the land in this district is suitable for sheep, but is mostly timbered and badly watered. Very few of the holdings are improved. All valueless timber should be ringbarked.

Some Essentials of Successful Settlement.

A man with 1,500 to 2,000 sheep to-day has a good income, and, compared with farming and dairying, an easy life. It takes very little more to start a small grazing farm with 1,000 sheep than a wheat or dairy farm. The areas in this district close to the railway line should be about 1,200 acres on which a few sheep could be kept, and dairying or mixed farming carried on. As one gets away from the line the areas should be increased from 2,000 up to 10,000 acres, say 70 miles from the line. This land should be cut up as suggested, all valueless timber ringbarked, and provision made for a permanent water supply by artesian and subartesian bores or tanks. The interest on the cost could be added to the rent. This would mean the settlement of hundreds of families who could not help being successful, and there would be an enormous increase in the production of wool.

Keep a Few Sheep.

My advice to every man on the land is to keep a few sheep. You may search the records and you will hardly ever see a failure among sheep owners.

Small areas as suggested will stop the spread of pear.

To increase the number of sheep and make this great industry a greater success than it is to-day smaller areas and the above methods must be adopted.

Answers to Correspondents.

Fowl Manure as a Fertiliser.

B.K. (Flying Fish Point, Innisfail)—

The Agricultural Chemist (Mr. Brünnich) advises that fowl manure is only a poor fertiliser, as it contains about $1\frac{1}{2}$ per cent. of nitrogen, $1\frac{1}{2}$ to 2 per cent. of phosphoric acid, and $\frac{3}{4}$ per cent. of potash. The best method of treating it is to allow it to rot in a pit, mixing it with litter or any other refuse. Fresh manure applied in the large amounts necessary is liable to encourage breeding of worms and insects. In well-rotted manure this risk is greatly reduced. Saltpetre would be a very expensive remedy, and its value for destroying worms and insects is doubtful.

Sorghum halepense.

J. WILSON-GREEN, Wavertree, Oakley.

The Government Botanist (Mr. C. T. White, F.L.S.), advises:—

The specimens represent the underground stems of the Johnson Grass (*Sorghum halepense*), a plant closely resembling Soudan Grass but differing in its perennial habit and underground fleshy stems (rhizomes). It is a useful fodder grass of which stock are very fond either green or as hay. It, however, can become a great pest in cultivation, almost any small piece of the underground white fleshy stem being capable of producing fresh plants. Like others of the Sorghum family (including Soudan Grass) it produces at times a prussic acid yielding glucoside and when eaten heavily by stock at those times may cause trouble and sometimes death.

The Grass Tree.

W. S. (Toowoomba)—

We have no special Bulletin dealing with this plant, but the following information supplied by Mr. C. T. White, F.L.S., Government Botanist, may be of interest to you.

Uses.—The resin or "gum" has long been an article of export and is used chiefly in the manufacture of cheap furniture polishes or wood stains, and lacquer for metal ware, also in the manufacture of linoleum. Picric acid, one of the most widely used of modern war explosives, is also obtainable from it, but it has probably little importance as a raw material in this direction. Experiments with the core as a source of alcohol, and the core and leaves of paper pulp, do not indicate much probability of commercial success.

Method of Collection.—J. H. Maiden in his "Useful Plants of Australia" gives the following as the usual method of collecting the gum in New South Wales. "The stems of the grass trees are hacked down, broken into convenient pieces, and allowed to fall into a sheet. A stout stick or flail commences the work of disintegration. The substance is then passed through a sieve, the ligneous portions of the grass tree for the most part failing to pass through its meshes. A gentle breeze is sufficient to winnow what has passed through the sieve, in order to render it ready for market; but it usually comes to Sydney having been subjected to no winnowing purpose.

Market.—There are several buyers. I think the people best for you to communicate with would be, Messrs. McGlew and Co., 138-140 Creek street, Brisbane, Messrs. Burns, Philp, and Co., Mary street, Brisbane, M. Finucan, Market street, Brisbane, and Wilfred Picken, Union Bank Chambers, Brisbane. The price is somewhere about £16 per ton. The principal seat of the industry in Australia is at Kangaroo Island, South Australia, where a particularly large species of grass tree occurs. The Department of Chemistry, Adelaide, South Australia, has issued a special booklet dealing with the grass tree gum and its method of extraction, and if you wrote to the Director he might be able to supply you with a copy. The price would be nominal.

Farm and Garden Notes for December.

Although November is regarded generally as the best period for planting the main maize crop, on account of the tasselling period harmonising later on with the summer rains, December planting may be carried out in districts where early frosts are not prevalent, provided a known quick maturing variety of maize is sown.

To ensure a supply of late autumn and winter feed, dairymen are advised to make successive sowings of maize and sorghums, to be ultimately used either as green feed or in the form of silage. The necessity for such provision cannot be too strongly urged. Farmers who have not had any experience in building an ensilage stack can rest assured that, if they produce a crop for this purpose, information and instruction on the matter will be given on application to the Under Secretary for Agriculture and Stock; also that, whenever possible, the services of an instructor will be made available for carrying out a demonstration in ensilage-making for the benefit of the farmer concerned and his immediate neighbours.

In districts and localities where supplies of lucerne are not available, sowings of cowpeas should be made, particularly by dairymen, as the lack of protein-yielding foods for milch cows is a common cause of diminished milk supplies and of unthriftiness of animals in dairy herds. Cowpeas and lucerne can be depended upon to supply the deficiency. The former crop is hardy and drought-resistant. When plants are to be used as fodder, it is customary to commence to feed them to stock when the pods have formed. Animals are not fond of cowpeas in a fresh, green state, consequently the plants should be cut a day or two before use. Economy is effected by chaffing beforehand, but the plants can also be fed whole. Chaffed in the manner indicated, and fed in conjunction with green maize, or sorghum when in head, in the proportion of one-third of the former to two-thirds of the latter, a well balanced ration is obtainable. Animals with access to grass land will consume from 40 to 50 lb. per head per day; a good increase in the milk flow is promoted by this succulent diet. The plant has other excellent attributes as a soil renovator. Pig-raisers will find it invaluable also.

A great variety of quick-growing catch crops, suitable for green fodder and ensilage purposes, may also be sown this month, notably Sudan grass, white panicum, giant panicum (liberty millet), Japanese millet, red and white French millet. Well prepared land, however, is required for crops of this description, which make their growth within a very limited period of time. French millet is particularly valuable as a birdseed crop, the white variety being more in favour for this purpose.

Successive sowings may be made of pumpkins, melons, and plants of this description.

In districts where onions are grown, these will now be ready for harvesting. If attention is given, in the case of garden plots, to bending over the tops of the onions, maturity of the crop is hastened. Evidence will be shown of the natural ripening-off process, and steps should be taken to lift the bulbs and to place them in windrows until the tops are dry enough to twist off. If a ready market is not available, and it is decided to hold over the onions for a time, special care should be taken in handling. Storage in racks in a cool barn is necessary, otherwise considerable deterioration is to be expected. Improved prices are to be looked for in marketing by grading and classifying produce of this description.

Cotton areas which were subjected to a thorough initial preparation, thereby conserving a sufficiency of moisture for the young plants, should now be making good headway and sending their taproots well down. Keep down all weed growth by scarifying as long as the growth will admit of horse work.

KITCHEN GARDEN.—Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered, otherwise the plants will leave off bearing. Seeds of all these may be sown for a succession. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Where there is an unlimited supply of water, and where shade can be provided, lettuce and other salad plants may still be sown. All vacant ground should be well manured and dug two spits deep. Manure and dig as the crops come off, and the land will be ready for use after the first shower.

FLOWER GARDEN.—Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked surface beneath the loose soil. Alternate light with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulaca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. These may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant them out at once in their new positions. Top-dress all lawns.

Orchard Notes for December.

THE COASTAL DISTRICTS.

The planting of pineapples and bananas can be continued, taking care that the ground is properly prepared and suckers carefully selected, as advised previously in these Notes. Keep the plantations well worked and free from weed of all kinds, especially if the season is dry. New plantations require constant attention, in order to give young plants every chance to get a good start; if checked when young they take a long time to pull up and the fruiting period is considerably retarded. Small areas well worked are more profitable than large areas indifferently looked after, as the fruit they produce is of very much better quality. This is a very important matter in the case of both of these fruits, as with the great increase in the area under crop there is not likely to be a profitable market for inferior fruit. Canners only want first-class pines of a size that will fill a can, and cannot utilise small or inferior fruit, except in very limited quantities, and even then at a very low price. Small, badly filled bananas are always hard to quit, and with a well-supplied market they become unsaleable. Pineapple-growers, especially those who have a quantity of the Ripley Queen variety, are warned that the sending of very immature fruit to the Southern markets is most unwise, as there is no surer way of spoiling the market for the main crop. Immature pineapples are not fit for human consumption, and should be condemned by the health authorities of the States to which they are sent.

Citrus orchards require constant attention; the land must be kept well worked and all weed growth destroyed. Spraying or cyaniding for scale insects should be carried out where necessary. Spraying with fungicides should be done where the trees show the need of it. A close lookout must be kept for the first indications of "maori," and as soon as it is discovered the trees should either be dusted with dry sulphur or sprayed with the lime-sulphur, potassium, or sodium sulphide washes. Borers should be looked for and destroyed whenever seen.

Early grapes will be ready for cutting. Handle carefully, and get them on to the market in the best possible condition. A bunch with the bloom on and every berry perfect will always look and sell well, even on a full market, when crushed and ill-packed lines are hard to quit.

Peaches, plums, papaws, and melons will be in season during the month. See that they are properly handled. Look out for fruit fly in all early ripening stone fruit, and see that none is left to lie under the trees to rot and thus breed a big crop of flies to destroy the mango crop when it ripens.

Keep leaf-eating insects of all kinds in check by spraying the plants on which they feed with arsenate of lead.

Look out for Irish blight in potatoes and tomatoes, and mildew on melons and kindred plants. Use Bordeaux or Burgundy mixture for the former, and finely ground sulphur or a sulphide spray for the latter.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Early ripening apples, plums, apricots, peaches, and nectarines will be ready for marketing during the month. They are unsatisfactory lines to handle, as the old saw, "Early ripe, early rotten," applies to all of them; in fact, the season of any particular variety is so short that it must be marketed and consumed as quickly as possible. All early ripening deciduous fruits are poor carriers and bad keepers, as their flesh is soft and watery, deficient in firmness and sugar, and cannot, therefore, be sent to any distant market. The available markets are quickly over-supplied with this class of fruit, and a glut takes place in consequence. Merchants frequently make the serious mistake of trying to hold such fruits, in the hope of the market improving, with the result that, instead of improving, the market frequently becomes more and more congested, and held-over lines have to be sent to the tip. There is only one way to deal with this class of fruit, and that is to clear the markets daily, no matter what the price, and get it distributed and into consumption as rapidly as possible by means of barrowmen and hawkers. Most early ripening fruits are useless for preserving in any way, their only value being what they will bring for consumption whilst fresh. This being so, it is only a waste of time and money to forward immature, undersized, and inferior fruit to market, as it is not wanted and there is no sale for it. It should never have been grown, as it is frequently only an expense to the producer, besides which, unless the fallen or over-ripe fruit is regularly and systematically gathered and destroyed in the orchard, it becomes a breeding ground for fruit fly and codling moth, as well as of fungi, such as those producing the brown and ripe rots. Early ripening fruits should, therefore, be carefully graded for size and quality, handled, and packed with great care, and nothing but choice fruit sent to market. If this is done, a good price will be secured, but if the whole crop—good, bad, and indifferent—is rushed on to the local markets, a serious congestion is bound to take place and large quantities will go to waste. It is better to get a good price for half the crop and destroy the balance than to rush the whole on to the market and get little or nothing for it.

Orchards and vineyards must be kept in a state of perfect tilth, especially if the weather is dry, so as to retain the moisture necessary for the development of the later ripening fruits. Where citrus fruits are grown, an irrigation should be given during the month if water is available for this purpose, excepting, of course, there is a good fall of rain sufficient to provide an ample supply of moisture.

Codlin moth and fruit fly must receive constant attention and be kept under control, otherwise the later-ripening fruits are likely to suffer severely from the depredations of these serious pests.

Grape vines must be carefully attended to and sprayed where necessary for black spot or downy mildew, or sulphured for oidium. Where brown rot makes its appearance, spraying with the potassium or sodium sulphide washes should be carried out. Leaf-eating insects of all kinds can be kept in check by spraying with arsenate of lead.

Vegetables will require constant attention in the Granite Belt area. Tomatoes and potatoes will require to be carefully watched in order to prevent loss from Irish blight, and no time should be lost in spraying these crops should this disease make its appearance in any part of the district, as it can be prevented by spraying with either Bordeaux or Burgundy mixture. These fungicides effectually protect the plants to which they are applied if used in time. If leaf-eating insects, such as beetles, grasshoppers, and caterpillars, are doing damage as well, add 3 or 4 lb. of arsenate of lead to the 100 gall. of spraying mixture used for the prevention of early and late blight (potato macrosporium and Irish blight), so that the one application will be effectual for both classes of diseases.

Keep all kinds of vegetables well worked, stirring the land frequently to retain moisture, and taking care to prevent the formation of a surface crust should rain take place. Remember that vegetables require plenty of moisture; therefore leave nothing to chance, but do your best to retain all the moisture in the soil you possibly can.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF SEPTEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING SEPTEMBER 1922 AND 1921 FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Sept.	No. of Years' Records.	Sept., 1922.	Sept., 1921.		Sept.	No. of Years' Records.	Sept., 1922.	Sept., 1921.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
	In.		In.	In.		In.		In.	In.
Atherton ...	0.63	21	0.03	1.58	Nambour ...	2.53	26	3.68	3.71
Cairns ...	1.72	40	0.44	3.85	Nanango ...	1.96	40	1.06	1.66
Cardwell ...	1.48	50	0.10	3.09	Rockhampton ...	1.33	35	0.57	2.08
Cooktown ...	0.59	46	0.17	0.95	Woodford ...	2.21	35	2.93	4.32
Herberton ...	0.19	35	0.12	0.89					
Ingham ...	1.28	30	1.75	5.19	<i>Darling Downs.</i>				
Innisfail ...	3.69	41	2.13	5.80	Dalby ...	1.79	52	0.68	1.25
Mossman ...	1.22	14	0.45	2.37	Emu Vale ...	1.91	26	0.35	2.82
Townsville ...	0.80	51	0.22	1.76	Jimbour ...	1.63	34	0.60	0.63
					Miles ...	1.48	37	0.56	1.22
<i>Central Coast.</i>					Stanthorpe ...	2.48	49	1.62	2.77
Ayr ...	1.56	55	0.04	1.32	Toowoomba ...	2.26	50	1.89	3.04
Bowen ...	0.84	51	0.25	1.07	Warwick ...	1.90	57	1.84	1.84
Charlton Towers ...	0.81	40	0.09	1.31					
Mackay ...	1.64	51	1.58	9.07	<i>Maranoa.</i>				
Proserpine ...	2.40	19	0.30	9.44	Roma ...	1.59	48	0.04	0.64
St. Lawrence ...	1.85	51	0.73	2.26					
<i>South Coast.</i>					<i>State Farms, &c.</i>				
Biggenden ...	1.74	23	0.45	2.22	Bungewongorai ...	1.46	8	0.01	0.58
Bundaberg ...	1.80	39	0.52	0.35	Gatton College ...	1.77	23	0.96	1.85
Brisbane ...	2.10	71	3.35	2.02	Gindie ...	1.07	23	0.52	4.64
Childers ...	2.01	27	0.45	1.34	Hermitage ...	1.72	16	1.66	2.28
Crohamhurst ...	2.71	30	3.28	5.28	Kairi ...	0.75	8	0.06	0.49
Esk ...	2.33	35	2.20	1.66	Sugar Experiment Station, Mackay	1.58	25	1.45	7.66
Gayndah ...	1.59	51	0.72	0.87	Warren ...	0.83	8	...	1.40
Gympie ...	2.18	52	1.83	3.17					
Glasshouse Mts. ...	2.29	14	2.93	5.03					
Kilkivan ...	1.74	43	2.12	1.77					
Maryborough ...	1.99	51	1.10	2.49					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for September this year, and for the same period of 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
State Meteorologist.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1922.	OCTOBER.		NOVEMBER.		DECEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5:34	5:50	5:4	6:8	4:50	6:32
2	5:33	5:51	5:3	6:9	4:50	6:33
3	5:32	5:52	5:3	6:9	4:50	6:34
4	5:31	5:52	5:2	6:10	4:50	6:35
5	5:29	5:53	5:1	6:11	4:50	6:36
6	5:28	5:53	5:0	6:12	4:51	6:36
7	5:27	5:54	5:0	6:12	4:51	6:37
8	5:25	5:54	4:59	6:13	4:51	6:38
9	5:24	5:55	4:59	6:14	4:51	6:38
10	5:23	5:55	4:58	6:15	4:51	6:39
11	5:22	5:56	4:57	6:16	4:52	6:39
12	5:21	5:56	4:57	6:16	4:52	6:40
13	5:20	5:57	4:56	6:17	4:52	6:40
14	5:19	5:57	4:56	6:18	4:52	6:41
15	5:18	5:58	4:55	6:19	4:53	6:41
16	5:17	5:59	4:55	6:20	4:53	6:42
17	5:16	5:59	4:54	6:20	4:53	6:43
18	5:15	6:0	4:54	6:21	4:54	6:44
19	5:14	6:0	4:53	6:22	4:54	6:45
20	5:13	6:1	4:53	6:23	4:55	6:45
21	5:12	6:2	4:53	6:24	4:55	6:46
22	5:11	6:2	4:52	6:24	4:56	6:46
23	5:10	6:3	4:52	6:25	4:56	6:46
24	5:9	6:3	4:51	6:26	4:57	6:47
25	5:8	6:4	4:51	6:27	4:57	6:47
26	5:8	6:5	4:51	6:28	4:58	6:47
27	5:7	6:6	4:50	6:28	4:59	6:48
28	5:6	6:6	4:50	6:29	5:0	6:48
29	5:5	6:7	4:50	6:30	5:0	6:49
30	5:5	6:7	4:50	6:31	5:1	6:49
31	5:4	6:8	...	...	5:1	6:49

PHASES OF THE MOON, OCCULTATIONS, &c

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer" Time is not used.

6 Oct. ○ Full Moon 10 58 a.m.
 14 " ☾ Last Quarter 7 55 a.m.
 20 " ● New Moon 11 40 p.m.
 27 " ☾ First Quarter 11 26 p.m.

Apogee on 5th at 6 a.m.

Perigee on 20th at 2.42 a.m.

An occultation of Delta Tauri will take place on 10th October about a quarter past 9. With binoculars or a small telescope this will be an interesting sight as the Moon will be in the group of stars called the Hyades of which Aldebaran is the principal star.

5 Nov. ○ Full Moon 4 36 a.m.
 12 " ☾ Last Quarter 5 52 p.m.
 19 " ● New Moon 10 6 a.m.
 26 " ☾ First Quarter 6 15 p.m.

Perigee on the 17th at 10.6 a.m.

Apogee on the 29th at 5.24 a.m.

Delta Tauri will again be occulted about 3 a.m. on the 7th; also Eta Virginis on the 15th about 9.30 p.m.; and the planet Saturn on the 16th about 5 p.m. when the Moon and it are far below the horizon.

4 Dec. ○ Full Moon 9 24 p.m.
 12 " ☾ Last Quarter 2 41 a.m.
 18 " ● New Moon 10 20 p.m.
 26 " ☾ First Quarter 3 53 p.m.

Perigee on 15th at 1.30 a.m.

Apogee on 27th at 2.6 a.m.

Delta Tauri will be occulted about 10 a.m. on the 4th, when the Moon and star are below the horizon, but on the 31st, when it will be occulted about the time of sunset, an interesting observation of the star's reappearance may be possible in the twilight.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XVIII.

DECEMBER, 1922.

PART 6.

ORGANISATION OF THE AGRICULTURAL INDUSTRY.

The Queensland Producers' Association.

Monthly Record of Progress and Achievement.

The last Regular Monthly Meeting of the Council of Agriculture was held in the Council Room, Teachers' Training College Building, Turbot street, Brisbane, on Thursday, 16th November. Subjoined is a Record of Proceedings covering many matters of first importance to the Farming Industry.

Attendance.

The Hon. W. N. Gillies (President), Messrs. J. Purcell (Vice-President), E. Graham, T. Flood Plunkett, J. T. Tod, W. Purcell, H. Keefer, J. E. Dean, F. M. Ruskin, H. I. H. Ross, W. Ranger, S. J. Howe, F. J. Morgan, T. Muir, R. Swan, C. V. Hives, W. G. Batchler, C. H. Pritchard, W. Short, and the Director (Mr. L. R. Macgregor).

DAIRYING COMMITTEE.

Metropolitan Milk Supply.

The Dairying Standing Committee recommended that the scheme submitted by the Metropolitan Milk Producers' Association in connection with the milk supply of the metropolis, be referred back for further investigation by the Committee.

Herd Improvements.

A letter from the Millaa Millaa Producers' Association, suggesting that bulls from the State Farm be leased for periods to farmers, was referred to the Director of Dairying (Mr. E. Graham) for his consideration, with a request that he furnish a report to the next meeting of the Committee. He was further requested to submit suggestions regarding the rules of Herd Book Societies in order that the matter may be taken up with the Breeders' Association.

Hamilton Cold Stores.

In connection with the control of the cold storage works at Hamilton, the President (Hon. W. N. Gillies) said that the Cold Stores were being built to meet the needs of the dairying industry, and for some time would be used exclusively for that purpose. Roma Street Cold Stores would be used for fruit. It was decided that control should be vested in the Department of Agriculture.

ADMINISTRATIVE COMMITTEE.

Regulations, Primary Producers' Organization Act.

A clause in the Draft Regulations under the Primary Producers' Organisation Act was amended to read:—

“That each District Council, upon formation, shall elect to the Council a representative who is a member of a Local Producers' Association, or, who, in the opinion of the Council, is a person directly representing producers.”

A further amendment provided for the conduct of the elections of District Councils by postal ballot from Head Office.

Secretaryship.

Approximately 140 applications were received for the position of Secretary and Accountant, and from these a selection of four was submitted by the Administrative Committee for consideration by the Council. It was decided that the Council interview each of these applicants at its next meeting.

Advertising Primary Products.

A scheme outlined by the Director for advertising primary products received the approval of the Council. With a view to stimulating public interest in the State's primary products, and to induce increased consumption, it is proposed to have successive window displays of various agricultural products, and to devote the first show, as from the beginning of December, to cheese. The display will be staged in the window of Kodak Ltd., Queen street. It will take the form of cheese exhibits, with pictures illustrating the various processes of manufacture and data showing production and the value of cheese to the State. Prepared dishes, showing how readily cheese may be used as an article of diet, together with attractive recipes and comparative tables figuring the nutritive value of cheese in relation to other forms of food, will be a feature of the exhibit.

Membership of the Association.

The Supervisor of District Agents reported that to date 533 Local Producers' Associations have been formed, with a total membership of 10,742, and the work is proceeding satisfactorily.

FRUIT COMMITTEE.

Selling Agents' Charges.

The Council noted that the Crown Solicitor is of the opinion that the Commissioner of Prices has the necessary power to fix the commission charges by agents in the sales of fruit in the Brisbane markets, and decided that in the circumstances he be requested to investigate the rates of commission being charged by agents with a view to bringing about a reduction in the rates at present ruling.

Elementary Chemistry.

A communication from the Department of Agriculture to the effect that a new edition of the Agricultural Chemist's (Mr. J. C. Brünlich) book “Elementary Lessons on the Chemistry of the Farm, Dairy, and Household” is about to be issued was noted with satisfaction.

The Summer Pineapple Crop.

Arising out of a communication received from the S.Q.F.S. Ltd., on the subject of the marketing of the forthcoming crop of pineapples, that Society was advised that action had already been taken by the Federal Fruit Council with the object of inducing Great Britain to give preference to Australian canned fruits and jams, and that arrangements had been made by that Council to advertise primary products. Further, that the question of exhibiting Queensland preserved fruits and other suitable products at the forthcoming Imperial Exhibition would be further considered at the December meeting of the Committee.

WHEAT COMMITTEE.

Maize Storage.

The Director submitted a scheme for the handling and storage of maize, in the Cairns Hinterland, which the Council considered, and decided to recommend to the Government the advisability of securing the services of an engineering expert to report upon the practicability of giving effect to the suggestion of the Director.

Tariff on Maize.

In connection with a letter received from the Wooroolin Local Producers' Association on the subject of the importation of maize from South Africa, the Committee advised the Association of the action already taken by the Council with the object of inducing the Federal authorities to impose a tariff duty of 3s. 6d. per cental on the maize in question.

General.

In the matter of the supply and distribution of bags to Local Producers' Associations, the Committee recommended that the Director consult with the Wheat Board.

The matter of one board to deal with marsupials and rabbits was listed for further consideration by the Committee at its next meeting.

The action taken by the Victorian Farmers' Union to bring to fruition the stabilisation proposals was noted with satisfaction.

The Department of Agriculture advised the Committee that draft plans of model dairy buildings were now in the hands of the printer.

A letter from the Hunterton Local Producers' Association urging the Council to establish Central Selling Agencies was referred to the Director.

NEW STAFF APPOINTMENTS.

Messrs. W. G. Wells, Cotton Expert, and J. M. Ward, Chief Instructor in Fruit Culture, were appointed recently to the professional staff of the Brisbane Office of the Department of Agriculture and Stock.

After qualifying in other fields, Mr. Wells entered the service of the United States Department of Agriculture at the Cotton Experiment Station, San Antonio, Texas, the largest cotton producing State in the Union. Mr. Wells first devoted his attention to plant breeding, and became the field man in charge of cotton breeding stations, doing field and demonstration work for his department in Texas, California, and Arizona. In 1920 he resigned his U.S. Federal appointment to join the professional staff of the S.W. Cotton Co., a subsidiary concern of the Goodyear Tyre Corporation. At the time of his engagement by the Queensland Government Mr. Wells was managing a cotton ranch for the Goodyear people. Mr. Wells is now travelling through the Queensland cotton areas for the purpose of making himself familiar with local conditions.

Mr. J. M. Ward was Fruit Expert for the Tasmanian Government, and his work and career are well known to the orchardists of this State. Mr. Ward has had a wide experience in practical fruit culture, and in organising and administrative work connected with the industry. Prior to joining the Tasmanian Department as assistant fruit expert, in May, 1914, he was engaged in orcharding at Glenorchy, and was one of the largest and most successful apricot growers in the Island State. He delivered lectures in practically every fruitgrowing district in Tasmania on many occasions, and for three years conducted winter horticultural classes at Launceston. Mr. Ward was one of the prime movers in organising growers on co-operative lines. In 1918 he visited the western States of America and Canada on behalf of the Tasmanian Government, and studied the latest methods of organisation, co-operation, and standardisation of fruit, and the treatment of pests. He gained much valuable knowledge, and on return placed it at the disposal of growers. At the invitation of the Victorian fruit growers, he lectured at their annual meeting, and this year he lectured in Adelaide before the Australian Fruitgrowers' Conference. Recently, at the invitation of the Queensland Government, he delivered a series of lectures extending over fourteen days through the citrus and deciduous fruitgrowing districts of this State. He has represented the Tasmanian Government at different conferences in the majority of the mainland States. Mr. Ward on two occasions visited Brisbane in charge of a Tasmanian exhibit of apples.

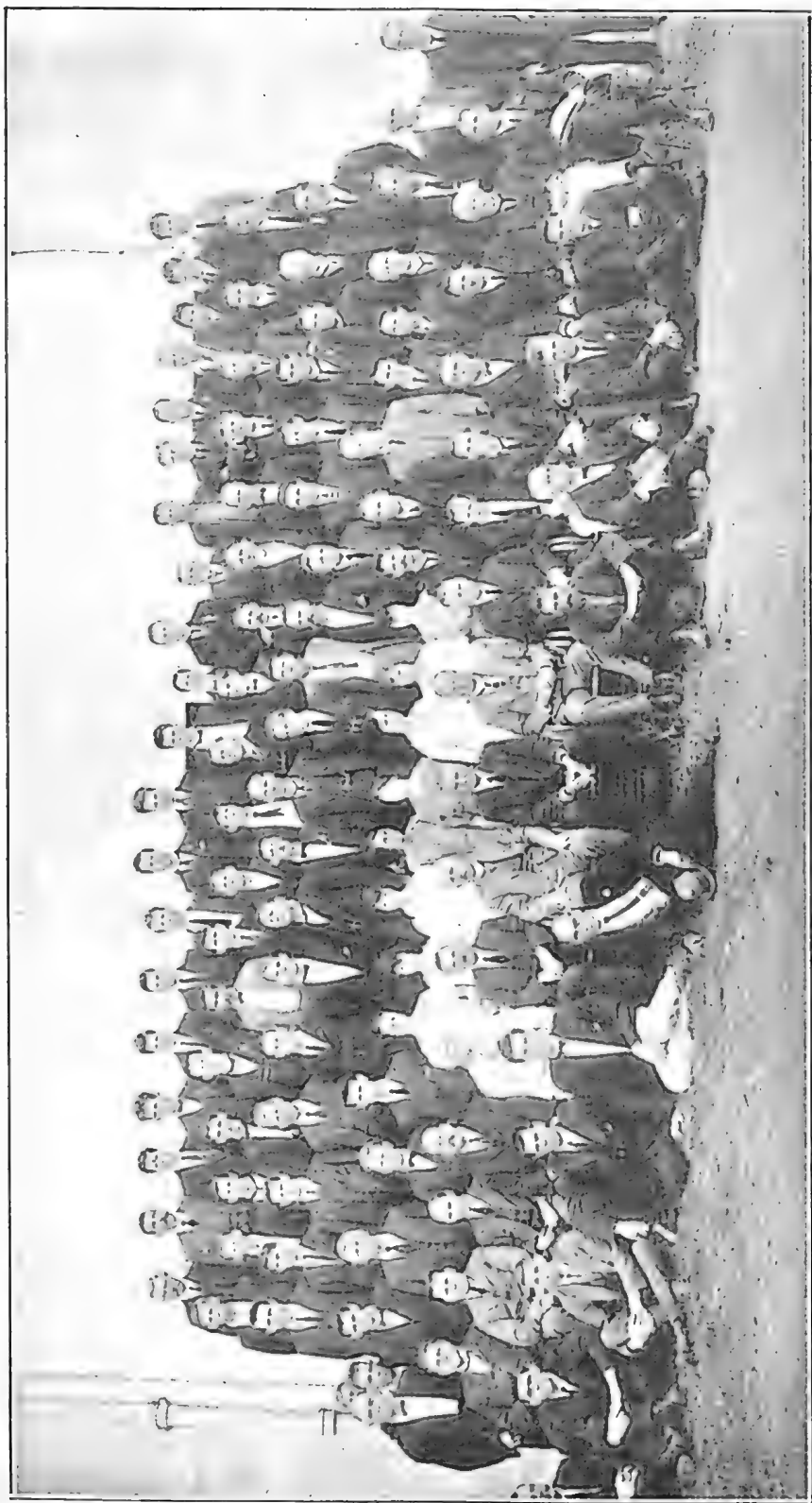


PLATE 89. THE MINISTER FOR AGRICULTURE, HON. W. N. GILLIES, AND THE FIELD AND GENERAL STAFF OF THE BRISBANE OFFICE,
DEPARTMENT OF AGRICULTURE AND STOCK.

FRUIT FLY INVESTIGATIONS.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the following report of the Entomologist in charge of Fruit Fly Investigations at Stanthorpe, Mr. Hubert Jarvis, for the month of October, 1922.

A TOOWOOMBA QUEST.

A visit was made on 11th October to Toowoomba in order to ascertain at this time of the year the presence or otherwise of the Fruit Fly (*Chaetodacus tryoni*) in that district, in any one or more of its phases.

Whilst pursuing this inquiry in company with Mr. W. Leslie, Instructor in Fruit Culture, visits of inspection were made to the following orchards and gardens:—J. McGovern, Middle Ridge; F. Scott, Bellevue street; Miss Fletcher, Dudley street, Range; T. Cardingly, Rangeville; W. Hutchison, Range; J. H. Hartman, Range; G. Dunster (Nurseryman), Toowoomba; E. Postle, Harristown; and F. Swift, Harristown.

In the Soil.

Search was made for the pupa of the fruit fly under the following trees:—Orange (Valencia late), lemon, custard apple, cherry plum, persimmon, apple (var. Lord Nelson), cherry guava, plum, quince, peach (late), loquat, and walnut. No living pupæ were, however, met with in these situations.

In Fruit.

The following fruits were examined for fruit fly larvæ:—Orange, lemon, and loquat.

In the citrus fruits no larvæ (maggots) were discovered; but in almost every case loquats examined were found to contain fruit fly maggots in different stages of growth. Many of these maggots have subsequently given rise to the mature fruit fly—*Chaetodacus tryoni*.

The loquat is a much grown fruit in Toowoomba, particularly the variety of it ripe at this time of the year; numerous gardens are scattered throughout the district, each supporting at least one loquat tree, in some cases two or three.

This fruit is, I understand, of little commercial importance. Ripening, as it does, just prior to the maturing of the citrus fruits, it certainly constitutes a serious source of fruit fly infestation to these later fruits, more especially so as in many cases loquat trees are growing close to and even amidst the orangeries. These features connected with the loquat and loquat growing would almost warrant the destruction of this tree, or at least a systematic destruction of its fruit, prior to its ripening.

Walnut.

Mr. T. Hutchison (Range) informed me that last season the walnuts on his trees, and on those of his neighbour also, harboured the maggots of some fly, which he presumed were those of a fruit fly, being similar in appearance and size to the maggots of the Queensland fruit fly.

These maggots, however, were probably those of some other fly and were first observed and recorded by Mr. H. Tryon, Government Entomologist and Vegetable Pathologist, in 1889 (*vide* Report on Insect and Fungus Pests of the Toowoomba District).

Wintering of Fruit Fly.

Although the soil under such late fruits as custard apple, quince, and late apple was carefully examined (*i.e.*, put through a 1/16-inch mesh sieve) for fruit fly pupæ, failure to find any would seem to indicate the non-wintering in the soil, of the fruit fly in the Toowoomba district. This, however, is a subject for further inquiry.

Some of the oldest residents at Toowoomba affirm that the loquat trees are fruiting there almost continuously throughout the year. It would be interesting to ascertain if loquats, ripening (should they do so) in very late autumn, or very early spring (about August), contain fruit fly maggots.

I am indebted to Mr. W. Leslie, Instructor in Fruit Culture, stationed at Toowoomba, for much help and assistance.

WARWICK INVESTIGATION.

A visit was also made on 30th October to Warwick, where a similar inquiry to the foregoing was carried out, and with somewhat similar results.

The only ripe fruit in Warwick gardens at the time of the year mentioned was the loquat, and in this fruit fruit fly maggots were discovered identical with those found in loquat fruit in Toowoomba. In Warwick, however, the loquat is quite a scarce tree, and thus considerable difficulty was experienced in locating the four trees met with.

TRAPPING FRUIT FLY EXPERIMENTS.

Glass fly traps containing various so-called fruit fly lures, and placed in various parts of the district, have, throughout the month, failed to attract one individual even of the Queensland Fruit Fly (*Chaetodacus tryoni*) nor have any examples of this species been observed at blossom.

FRUIT FLY MAGGOTS IN IMPORTED FRUIT.

On 18th October Instructor J. Henderson submitted specimens of late Valencia oranges harbouring fruit fly maggots; these oranges were sent in the course of trade from Brisbane. From twelve of them, 130 fruit fly maggots were reared to the pupa stage in the laboratory, one female fruit fly (*Chaetodacus tryoni*) having so far emerged to date. The careful and thorough inspection following this event now being carried out, of all fruit imported into the Granite Belt, should prove a control measure of much importance.* The possible injury to this district, through the distribution of even one or two cases of infested oranges (should such escape inspection) cannot be over-estimated; this amount being, in fact, very much more than sufficient to distribute the fruit fly throughout the entire area. Any recipient of fruit—either by rail or post—on finding this to contain maggots, should immediately destroy it either by fire or by burying it at least 2 feet underground.

I consider this watchfulness and care, more especially at this time of the year, of the utmost importance, in keeping the district free of fruit fly, and were this care and watchfulness consistently carried out by every individual, it would, it seems, not only materially help to control the pest, but would also undoubtedly retard its advent to this district. Much, however, has yet to be learnt in relation to the habits and life history of the fruit fly (*Chaetodacus tryoni*), the distance it can fly, its longevity, native host-fruits, &c.

Presuming, as is stated by some entomologists, that the fruit fly cannot fly far (i.e., about $1\frac{1}{2}$ miles), the importance of closing every avenue of mechanical introduction by the systematic inspection before alluded to, or by exclusion (if deemed necessary) with respect to certain fruits during the spring months, finds in this fact especial justification.

OTHER INJURIOUS INSECTS.

Peach Aphis.

Although not this season so widely distributed throughout the district as in some previous years, yet the Black Aphis of the peach has done, and is still doing, a considerable amount of damage in certain districts. Control experiments have been started with the injector (kindly loaned to the office by Mr. W. F. Barnard), the chemical used being carbon bi-sulphide. Several trees were so treated at Eukey, and not only there for Black Aphis of stone fruit, but also for the Woolly Aphis of the apple. It is hoped to continue experiments in this direction in other localities also, and results as obtained will be reported monthly. On 10th October the Black Aphis was found plentifully on the fibrous roots of peach trees at Applethorpe. No winged forms were observed in this situation, but adult viviparous wingless females and immature forms also were abundant, all underground at a depth of about 12 inches. Should this insect winter on the roots of the peach and plum trees as is very probable, control measures with the injector in late winter might prove of benefit.

Aphis sp.

On 10th. October my attention was drawn to an Aphis visitation at Applethorpe. This Aphis, that at present is specifically undetermined, visited the above district and simultaneously (as I have since ascertained) the entire Granite Belt. Although in vast numbers and settling on cultivated plants of a great many varieties, this insect appeared to do little harm and, moreover, by the end of the month had practically disappeared. It was observed on the following trees and naturalised herbaceous plants:—Apple, plum, pear, nectarine, oat, milk thistle, pigweed, turnip, and bean (broad and French varieties). I learn from the testimony of various orchardists—old residents in the district—that the visit of this Aphis is a yearly one, and that it has not been found to ever materially damage fruit trees. In my own garden, however, I observed that both "Broad" and French beans were, as the outcome of infestation by it, retarded in growth.

* Mr. Henry Tryon, Entomologist in Chief, Department of Agriculture.

FUNGUS DISEASES.

Several specimens manifesting disease of fungus or other origin were during the month submitted to this Office, and forwarded to the Government Entomologist and Pathologist (Mr. H. Tryon) for identification of the parasitic agent operating.

FIELD WORK.

Visits of inspection have been made during the month to the following districts:—Bald Mountain, Eukey, The Summit, Beverley, Glen Aplin, Applethorpe, Warwick, and Toowoomba.

SUGAR: FIELD REPORTS.

The Northern Field Assistant, Mr. E. H. Osborn, reports under date 9th October, 1922, as follows:—

Babinda.

This area was inspected early in the month and found to be suffering from the same dry conditions that were in force further south. The registered rainfall to 30th September amounted to 162.01 inches, against 328.1 inches for the same period during 1921. Of this fall 3.66 inches fell in July, 1.52 inches in August, and 2.45 inches during September.

Very cold weather had also been experienced during the spring and winter months, and consequently the cane had made poor growth and the total amount to be harvested will be considerably below the early estimates.

These weather conditions are also responsible for the backward state of the recently cut ratoons, and to a slighter extent the young plant cane.

Generally speaking, the strike of plant cane has been a very good one and at time of visit it was very green and healthy looking, though somewhat backward. In nearly all cases it was very clean and showed that full advantage had been taken of the dry weather to carry out thorough cultivation. The mill is doing very good work, averaging well over 5,000 tons per week, and the cane supply is very regular. The density figures were also very good, as the average density for the 5,445 tons crushed in the week ended 30th September was 15.4 c.c.s., whilst the tons of cane to ton of sugar worked out at 6.7 tons. These figures in the Babinda area are very good. The large amount of land recently stumped and ploughed was most noticeable.

Tractors.—Tractors have become popular in this area, no fewer than four of different types having been landed here since last June.

New Varieties of Canes.—Quite a number of the local growers have planted out canes from the South Johnstone Experiment Station, the principal varieties being Tableland Badila, E.K. 1, E.K. 28, Q. 903, H. 146, H.Q. 409, H.Q. 458, &c., and in most cases these germinated well.

Freshwater.

This area was visited early in the month and despite the dry weather the general appearance of the crops was most encouraging. Some very heavy crops have been harvested and most of the recently cut cane has ratooned very well; some splendid young plant cane was also seen. Badila is the only cane grown at Freshwater, and it certainly responds well on the rich and deep alluvial flats.

Hambledon.

A very large area of land has been planted and replanted lately in the above area, and in most cases the strike has been very fair. Quite a large area of the land ploughed out has been grub-affected, and in most of these places where Badila has been grown D. 1135 is now being planted. Upon several of the farms small plots had been planted out with some of the newer varieties obtained from South Johnstone Experiment Station, and generally speaking they looked very fair.

Most of the paddocks of young plant cane looked very clean and free from weeds, and all that was wanted was a good downpour of rain to help the growth along.

Mulgrave Mill Areas.

Crushing was in full swing in this large area and the mill was doing exceptionally good work, the general mill work and the quantity of sugar turned out easily beating all former records.

No time had been lost in the mill or field by labour troubles, and everything was working in a very satisfactory manner. Regarding the cane being harvested, the dry conditions have reduced the previous tonnage estimates considerably, and at time of visit the mill expected to finish crushing early in December. In visiting the farms it was most noticeable that those that had been kept in a high state of cultivation were standing up to the dry conditions far more than the others. Generally speaking, the standard of cultivation in this area is high; had it not been so the crops now being cut would have been much lighter.

A large quantity of manure (mixed) is annually used in the area, also green manuring and liming. Another manure that is used here is crushed filter press cake which is bagged and supplied to the growers by the mill management. All through the area large blocks of land have been worked up and planted for next season, and in most cases a good strike had been the result. Rain was wanted urgently. Recently cut ratoons were very backward in growth. Badila, H.Q. 426, Goru, and D. 1135 are easily most in favour, while Malagache was seen in one or two places. Some very fair crops of D. 1135 were harvested. This variety did not cut as well as was expected of it earlier in the season, although it kept its growth fairly well during such a dry period.

Quite a large area has been planted out, especially in the grub-affected areas, and the strike has been uniformly good. While in the area a visit was made to the locality known as "the Little Mulgrave." This area is, roughly, speaking, some 5 miles from the end of the permanent tramline at Riverstone, and at present a couple of miles of temporary rails are joined on to this, leaving some 3 miles to be served with rails from this point.

The interested growers talk of finding the requisite rails and thus open up some first-class country for next year. Some of the growers consider that they can find (approximately) some 800 to 1,000 acres of really good cane land within a couple of miles of this proposed railhead. The land itself is mostly rich pockets of deep light alluvial soil, suitable for growing very heavy crops of cane. Some remarkably good Badila, going probably from 45 to 50 tons to the acre, was being cut upon Mr. C. Ross's farm; the recently cut ratoons from same, although, so far, unworked, looked very well.

Several fine paddocks of young plant cane were also noticed in this locality; in fact, the general appearance of the cane being cut and also the young cane coming on was extremely good.

It is satisfactory to note that the use of tractors is increasing rapidly in this area. While visiting the district a consignment of three was made to a local agent.

Pests.—A good deal of loss was caused by grubs, bats, and borers during the year. A number of old and experienced growers state that the rat pest upon some of the farms adjacent to the river or creeks has been greater than in any former years, and from personal observation joined to a good knowledge of the district I believe such is the case. Grubs and borers also did a good deal of damage, and on top of this the lengthy spell of very dry weather during the past few months helped to account for the 20,000 tons of cane that the mill management expect to be short by the end of the crushing season. At time of my visit rain was urgently required to help the recently cut ratoons and also the young plant cane along. So far the latter looks remarkably green and healthy and is very free from weeds. A few light showers of rain were experienced about the 23rd and 24th, which will do a great deal of good, but much more is required to be of any lasting benefit. Without such the outlook for next season is not too promising.

The Southern Field Assistant (Mr. J. C. Murray) reports under date 23rd November, 1922.

Mackay.

In the immediate environs of Mackay the cane cut with moderate tonnage had good c.e.s. value. The Racecourse Mill, which takes most of this cane, had a good run, and has finished crushing. The haulage facilities in this area are not up to date, the farmers having to cart their cane by means of horse teams, which mutilate the roads and cause much loss of good time. Notwithstanding this drawback the area is progressing in the direction of good farming, and there is an atmosphere of considerable apparent prosperity.

Varieties which gave good returns in this locality for this season are Q.813, with an approximate average of 16 c.e.s.; M.1900 seedling, density 17 c.e.s.; Malagache, 14 c.e.s.; M.189, 17 c.e.s.; Badila, 17 c.e.s.; and Q.970, 16 c.e.s. The cutting this year has been very fair, although an occasional grower has been taking off too

much top. Tops tested taken from Q.813 analysed 11.4 c.e.s., and it is probable, judging by the cane cut off, and taking the density of the top as a basis, that growers cutting too severely were losing about £3 per acre.

The borer is inflicting a little damage on the cane this year in this locality, although not sufficiently to cause the farmer much anxiety. M.1900 Seedling appears to have been attacked more than other varieties, and the effect is slightly noticeable in the purity tests. Mr. Keogh, the chemist in charge at Mackay Sugar Experiment Station, noticed that in unbored 1900 Seedling the purity was 96.4, while bored cane of the same variety stood at 94.2. However, the incidence of cane damaged by borer is so slight as not to cause the farmer any misgivings. This area is also fairly free from the depredations of the cane grub.

Mirani.

The cane on this section of the Pioneer, as far as Pleystowe, has not cut heavily, but the sugar-content has been high. The crops are coming on for next season, and look very well indeed, although rain is badly needed. Much of the young ratoon cane looks particularly well, especially that which was not cut too early in the season. Such canes particularly are M.1900 Seedling and H.Q.426. The farmers in this area are now undoubtedly doing good farming. This is probably due to two reasons—a better financial position and an increased knowledge of their soil and its requirements. More lime is wanted on these soils, and a still greater use of crops calculated to strengthen the humus supply. Fertilising with highly concentrated fertilisers should be undertaken most carefully, and it is to be pointed out to the farmers that much valuable information can be obtained within the community by carefully watching each other's fertilising efforts on typical soils.

A small amount of leaf disease is in evidence in the cane in this locality. The only effective method of contest in this respect is careful plant selection. In the case of gumming, of which a little is also apparent, the field should be given as long a rest as possible and a resistant variety to gum such as Q.813 or the early maturing variety H.Q.285 planted. However, the injurious effects of these diseases are very slight in this district at present.

Finch Hatton.

The cane on the fertile flats in the vicinity of Finch Hatton probably cut heavier tonnages than elsewhere in the Mackay district. The mill had a very fair run, and the c.e.s. value of the cane was uniformly high. On the higher lands of Finch Hatton the soil is not so rich, and wants deep cultivation and green manuring. It is probable, regarding fertilisation, that on a soil of this description meatworks manures would be most effective, taking as a basis known results on soils that are fairly typical in colour and texture to these.

Cane varieties doing well in this district are D.1135, Q.813, H.Q.426, Cheribon, and M.1100 Seedling.

Farmers are strongly advised not to use the plough in young plant cane, for the reason that at a critical state of the plant's life the young roots are damaged, and growth is also retarded by the inverting of soil particles and a consequent disturbance of the fermentation and chemical processes that are going on in the soil at this critical period. Cultivating ratoon interspaces and young plant cane interspaces are entirely different processes.

The growers in the Finch Hatton district are handicapped by primitive haulage arrangements, much of the cane having to be carted by teams several miles. This applies particularly to the farmers on the north side of the river. There is a big area of cane land in this fertile district still uncultivated. However, with the increase of settlement and the assurance of a living price for cane this land will in time, no doubt, be farmed.

Plane Creek.

Crops here are fair, with the usually high density that the farmers obtain. Young plant and ratoon crops are making good growth, although more rain is badly needed. During the last few years farmers in this district have greatly increased their areas on account of the encouragement given by recently prevailing prices.

Cane varieties looking well at present are H.Q.285, Q.813, H.Q.426, M.1900, and D.1135. These are all favourite varieties here. The growers are recommended to try E.K.I., as well, this cane having excellent standover properties. The mill at Sarina has this year reached a high standard of efficiency, and the crushing went through almost without interruption. An excellent labour-saving device recently installed by the management is a big switcher. It is interesting to note the speed and facility with which the operator does his work during the bagging process.

Homebush.

The young crops, plant and ratoon, look well here, and the cutting season is progressing without interruption. The Rosella Siding presents a busy appearance just now, with its electric lighting plant, loading crane, and gangs of workmen all going at high pressure. Rain is wanted on the Homebush areas, although the cane can still go on without rain for some time yet without receiving a noticeable check.

The growers are doing good cultivation generally, but more vegetable manures are wanted on their soils. The soil here is a light forest loam for the most part, and meatworks fertilisers would probably be most beneficial.

Farleigh Areas.

In common with the other Mackay districts the tonnage on the farms within the influence of the Farleigh Mill has not been great this season, but the sugar-content of the cane has been high. Cane varieties that have given the farmers good returns are M.1900 Seedling, Q.970, Q.1121, Q.855, H.109, D.1135, Cheribon, and Uba. The lastnamed cane is, however, being displaced. Cane diseases, as far as could be observed, are not much in evidence, although in the case of old varieties still growing, but not as staple canes, gumming and "striped leaf disease" are apparent. Farmers are advised that as soon as they definitely decide a cane is of no use for their particular conditions, to get rid of it altogether and not allow inoculated stocks to grow on the outskirts of the farm, and in the farm garden. Neglect increases their susceptibility, and these canes become a menace to the healthy ones.

Methods of cultivation are uniformly good, although subsoiling would improve the drought-resisting properties of the soil, as well as better drainage and the more free advent of soil air. Green manure crops are recommended, as well as local experiment plots as a basis for more extensive fertilisation. Growers are also recommended to submit more samples of soil than they are doing to the Bureau for chemical analysis. While this latter process is by no means conclusive, it forms an excellent basis for local experiment.

CANE PEST COMBAT AND CONTROL.

The Entomologist, Sugar Experiment Stations (Mr. Edmund Jarvis), reports under date 24th November, 1922, as follows:—

Experiment Plots at Meringa.

The cane on these plots was cut during the second week in August, and the crop went about 18 tons to the acre, the c.e.s. being 8.14.

On the plot treated with naphthalene (150 lb. per acre) the cane sticks were straighter, and about 6 inches longer than those on the adjoining check plots. The application of chloride of lime, tobacco dust, and coal-tar gave negative results; the stools on these plots being practically the same height as those on controls alongside.

Where the soil had been sprayed with an emulsion of carbolineum and soap (carbolineum 2½ pints, soap 3 lb., water 25 galls.) the cane was noticeably higher than anywhere else. Fifty per cent. of the sticks on this plot were standing, and about 10 per cent. of those on the adjoining check plot.

Owing to the crop as a whole having escaped serious damage from grubs, the results of our experiments with these surface deterrents were rendered inconclusive, although data of more or less economic value was obtained.

Injury from Moth-Borer.

Serious infestation by the Large Moth-Borer (*Phragmatiphila truncata*, Walk.) was noticed this season (August to October) among mature crops of Badila and D.1135 growing on lowlying ground near Aloomba. The caterpillars were found mostly near the top of the canes, and also occurred freely in central and basal portions.

From reports lately to hand, this most-pest appears to have been very much in evidence during the present season, both at Meringa and Gordonvale; owing probably to climatic conditions having proved unfavourable to the activities of its various parasitic enemies.

The chief natural controlling factor of *truncata* in the Cairns district is a tiny Braconid wasp (*Apanteles nonagriæ*, Oliff) the life-cycle of which was studied

at our laboratory last December (see "Queensland Agricultural Journal, vol. xvii., p. 81), when it was found that its various stages (from egg to wasp) occupy a period of from 15 to 21 days.

This parasite was bred by Oliff in 1893, from caterpillars destroying cane in New South Wales; who, when reporting at that time, stated:—"After careful observation I have convinced myself that one of the chief, if not the chief, reasons that *Nonagria* (*Phragmatiphila*) has not spread more widely and done more damage on the Clarence is the fact that two minute and highly interesting parasites are present in such numbers as to keep it within reasonable limits. The most abundant of these parasites is *Apanteles nonagriæ*." The other parasite alluded to by Oliff is a chalcid wasp (*Euplectus howardi*, Oliff) which up to the present has not, to my knowledge, been found in Queensland. Several broods of *Apanteles* were reared by us last year for liberation at Ayr and Rita Island, on the Lower Burdekin; and we hope to continue this work next month, with a view to distributing these parasites on various selections in the Cairns district.

Fumigating Cane-Beetles.

Excavations made in canefields at Meringa and Highleigh early in September revealed the fact that grey-back beetles had emerged from the pupae, and were awaiting an opportunity to leave the soil.

Carbon bisulphide was injected at a depth of nine inches, immediately under the lines of stools, in twelve different places, the amounts given varying from two to eight drachms. When examined 24 hours later, 17 dead and 13 living beetles were found; all the live specimens, however, being located at distances exceeding nine inches from the actual spots of injection.

Notes on Para-Dichlorobenzene.

Since reporting on the possibilities of this fumigant in connection with cane-grub control, a letter has been received by the writer from the manufacturers in Germany, stating that for many years the firm of Fritz Schult, of Leipzig, have had the exclusive sale of the preparation in question, which they have lately put upon the market under the trade name of "Globol." At the present time it is largely used in wool-mills, magazines, and storehouses all over the world. "Globol" can be supplied by them in quantities of not less than 100 lb. at the rate of 1s. 3d. per lb., this price, however, being subject to fluctuation.

It would take 134 lb. of para-dichlorobenzene (costing at least £8 sterling) to treat an acre of cane with $\frac{1}{4}$ -oz. injections on one side only of rows of cane standing five feet apart.

We may, of course, find as a result of field experiments to be carried out shortly, that $\frac{1}{4}$ -oz. doses injected eighteen inches apart may prove effective, which would materially reduce the cost.

Victor Leggo and Co., of Melbourne, Victoria, who were hoping to be able to manufacture para-dichlorobenzene, have written to me (under date 5th October) stating:—"After making inquiries in England as to the price at which this compound could be delivered in Australia, we find that we could not possibly make it at a price which would be competitive. We have, therefore, abandoned the idea of making it."

When last reporting on the merits of this compound as a fumigant for cane-grubs ("Australian Sugar Journal," vol. xiv., p. 341) we stated that sets of *Badila* planted immediately over injections made in open ground at the laboratory had rooted in the contaminated soil, and the growth above ground at that date appeared normal. Subsequent development of these sets, however, did not prove satisfactory, and accordingly further tests were carried out during September and October with cane sets having single buds, which were planted both in pots and in the open.

As a crucial test a number of tins of soil, about $3\frac{1}{2}$ inches square by 5 inches deep, were treated with $\frac{1}{4}$ -oz. injections placed immediately below small sets two inches long each having a single bud.

As might have been expected, the gas confined in this way had an injurious effect, owing probably to the fumes entering the cut ends of the sets. The eyes in some of the tins produced plants about 3 inches in height, which then stopped growing, owing to non-development of roots. It is worth noting that a cow-pea seed, which had not of course received any mechanical injury, germinated in one of these treated pots, producing a small plant which at present appears to be developing in a normal manner.

In an experiment started 16th October twelve stools of cane about 30 inches high were given $\frac{1}{2}$ -oz. injections placed just under the sets, and when examined after an interval of 24 days both the treated and control plants had noticeably increased in size.

Another experiment is being conducted in which the doses are placed from 4 to 6 inches from the stools, and on a level with or slightly below sets. This method, as already pointed out, admits of simple application, and we know that the fumes will penetrate the soil sufficiently to destroy the grubs.

With regard to future extensive field experiments with this chemical, the points we intend studying will relate (as mentioned in my annual report for 1921-22) chiefly to its effect on young growing cane roots and newly planted sets; while the influence exercised by heavy rain, temperature, closely packed volcanic soils, clay lands, &c., on the rate of evaporation and penetration of para-dichlorobenzene will also, doubtless, furnish data of economic interest.

Tachinid Parasite of Weevil-Borer.

The work of breeding fly parasites for future liberation on borer-infested plantations has been continued from month to month; this activity of our Experiment Station being second only in importance to research work in connection with cane-grub control.

During August last Mr. Cottrell-Dormer, Assistant Entomologist, let go sixty tachinid flies at South Johnstone, and later (27th October) liberated eighty-four at Macknade, where arrangements have been made by us to collaborate with the mill manager, Mr. West, in this useful work. The Colonial Sugar Refining Company have always been keenly alive to the great economic importance of this fly-parasite (*Ceromasia sphenophori*, Vill.) as a natural controlling factor of the Beetle Borer. In 1913 they introduced it into Fiji, and being satisfied with results obtained there, sent an assistant entomologist to Queensland last year to establish a cage for breeding these flies at Macknade Mill. In view of the extensive area under sugar-cane in the Herbert River district, it was, as already mentioned, considered advisable that our Sugar Bureau should unite forces with the company, in order that parasites might be liberated at many different centres, and losses due to the borer be reduced throughout the cane area with as little delay as possible.

Goondi was visited this month (October), when on the 20th instant 26 parasites were given their liberty on Mr. Davis' farm at Daragee, the block retained by Mr. Davis for breeding the flies being well infested with borers.

Introduction of Digger-Wasp Parasites.

A third breeding-cage for rearing scollid wasp-parasites, and additional numbers of tachinid flies, is just finished, and has a capacity of about 450 cubic feet. The Digger-wasps, which we hope to receive from Java about the beginning of January next, will be bred and ultimately liberated from this cage in canefields at Meringa and Gordonvale, where it is expected they will attack the grubs of our grey-back cockchafer. Details of this fascinating phase of grub control will be duly reported from month to month, after arrival of the first consignment of cocoons containing these parasitic wasps.

QUEENSLAND TREES.

By C. T. WHITE F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 16.

RED CARABEEN.

The Red Carabeen (*Weinmannia Benthami*) is a very common tree in the scrubs of the mountain ranges of Southern Queensland, such as the MacPherson Range. It is especially common on Robert's Plateau. In New South Wales it is found as far south as the Manning River. The tree is a large one, attaining a height of 120 feet and a barrel diameter of 3 feet. The barrel is often flanged at the base. The bark is grey, sometimes slightly wrinkled and marked by small warts. When cut it is seen to be deep red or brown in colour, but paler towards sapwood. It measures about $\frac{1}{4}$ -inch thick on a tree with a barrel diameter of 2 feet 6 inches. Up to the present the timber does not appear to be extensively used. It should be useful for general indoor work, such as fittings and cabinet-making.



Photo. by the Authors.]

PLATE 90.—RED CARABEEN (*Weinmannia benthami*).

A tree in the Ranges eastward of Emu Vale, Killarney District.

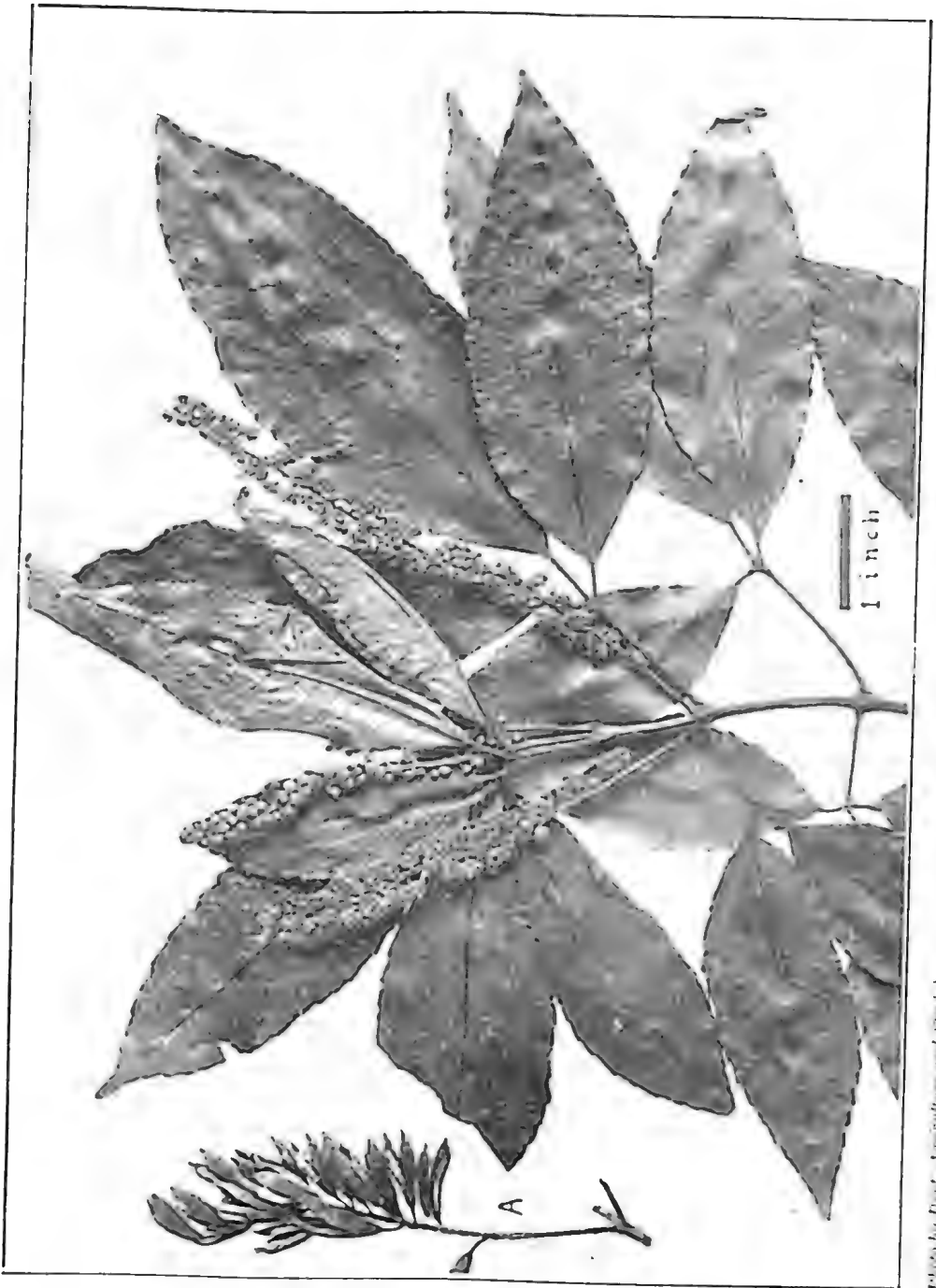


FIG. 91.—RED CARABAEA.
Showing leaves, flowers, and capsules (A).

Photo by Dept. Agriculture and Stock.]



PLATE 92.—AN UNUSUAL RATION. MRS. HUGH McMARTIN, of PULLEN VALE, INDOORHILL, FEEDING DORSET HORN LAMBS ON KUDZU LEAVES AND SWEET POTATOES.

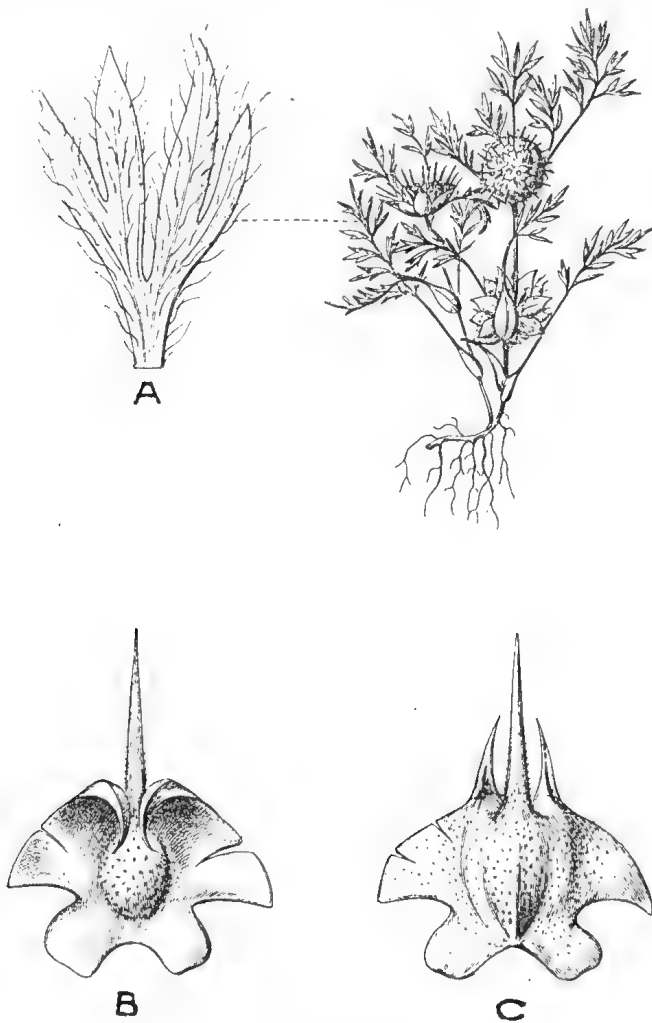
WEEDS OF QUEENSLAND.

By C. T. WHITE, Government Botanist.

No. 28.

THE JO JO WEED (*Soliva sessilis*)—A NEW LAWN PEST.

Description.—A small annual plant 1—4 inches in height bearing a profusion of burrs. Stems and leaves covered with rather long white hairs. Leaves about $\frac{1}{2}$ —1 inch long, the upper half finely divided, the lower half consisting of a long slender stalk. Flower-heads consisting of about 15—20 flowers, sessile in the leaf axils, $\frac{1}{4}$ inch across, surrounded at the base by 7—8 hairy bracts. Achenes ("seeds")

PLATE 93.—JO JO WEED (*Soliva sessilis*).

A, Leaf enlarged; B, Front view, and C, Back view of achene or "seed" much enlarged.

(After J. G. Baker in Martius' "Flora Brasiliensis.")

1 line long, tipped by a sharp, strong spine 1 line long, each "seed" winged at the sides and each wing terminating in an incurved tooth.

Each flower head consists of 7—9 male flowers and 9—12 females; each of these latter is capable of forming a spiny "seed" or achene, with the consequence that the flower head develops into a seed-head—a burr of 9—12 sharp spiny "seeds."

Distribution.—A native of Chili, South America. According to Mr. J. H. Maiden ("Agricultural Gazette" of N.S.W. XXVIII., 183) it first made its

appearance in Australia at the Cricket Ground, Moore Park, Sydney, 1899, and soon became so bad that patrons could no longer sit on the grass with comfort through it.

Specimens were brought to me last year by Mr. J. E. Young, of Graceville, Brisbane, who said that the plant was becoming a pest in that suburb, and this year the plant has made its appearance in several places about Brisbane. It seems to have a preference for lawns and short grass and is one of the worst lawn pests that has so far made its appearance in Queensland.

Botanical Name.—*Soliva*, named in honour of Salvator Soliva, a Spanish physician and botanist; *sessilis*, from the Latin referring to the closely sessile flower heads of "burrs."

Common Name.—"Jo Jo Weed," according to Mr. Maiden, is a local name in use in New South Wales.

Eradication.—Grass is more resistant to sprays than herbaceous plants as a general rule, and the Agricultural Chemist (Mr. J. C. Brünlich) recommends an application of a solution of common salt ($\frac{1}{4}$ lb. to a gallon of water); if it is found to be too severe on the grass a good soaking of water should be given later to leach some of the salt away. Mr. Maiden states that in New South Wales it has been found that Buffalo Grass (*Stenotaphrum*) makes too heavy and coarse a mat for the weed to penetrate, with the consequence that there is no trouble with this weed in Buffalo Grass lawns.

Botanical Reference.—*Soliva sessilis*, Ruiz et Pav.. Prodr. peruv 113 t. 24 et Syst. 215.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS FOR OCTOBER, 1922.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Bellona	Ayrshire ...	30 Aug., 1922	990	3.8	43.80	
Pretty Maid of Haremar	" ...	11 Sept., "	900	4.1	43.20	
College Meadow Sweet	Friesian ...	18 Sept., "	900	3.0	31.20	
Confidence ...	Ayrshire ...	13 Aug., "	690	3.8	30.90	
Magnet's Leda ...	Jersey ...	8 Feb., "	544	4.5	30.60	
Hedges Nattie ...	Friesian ...	20 May, "	660	3.9	30.00	
Yarraview Snow-drop	Guernsey ...	1 Sept., "	540	4.6	29.10	
College Cold Iron	Jersey ...	25 Jan., "	406	5.4	27.55	
Miss Betty ...	" ...	17 May, "	450	4.9	25.80	
Thyra of Myrtleview	Ayrshire ...	22 Aug., "	690	3.2	25.50	
Songstress ...	" ...	4 July, "	570	3.8	25.50	
Dawn of Warragaburra	Jersey ...	17 May, "	510	4.3	25.50	
Snowflake ...	Shorthorn...	20 Feb., "	570	3.8	25.50	
College Cobalt ...	Jersey ...	3 April, "	450	4.8	25.20	
Hedges Dutchmaid	Friesian ...	23 Sept., "	690	3.0	24.00	
Wattle Blossom ...	Guernsey ...	8 Sept., "	480	4.3	24.00	
College La Cigale	Jersey ...	10 July, "	420	4.5	22.20	
Fair Lassie ...	Ayrshire ...	1 Sept., "	570	3.3	21.90	
Dear Lassie ...	" ...	19 June, "	540	3.5	21.90	
La Hurette Hope	Jersey ...	30 June, "	420	4.4	21.60	
College St. Margaret	" ...	16 June, "	360	5.0	21.00	
Prim ...	Friesian ...	6 Feb., "	544	3.3	20.74	
Miss Fearless ...	Ayrshire ...	30 May, "	540	3.2	20.10	
Netherton Belle ...	" ...	19 July, "	450	3.8	20.10	
College Ma Petite	Jersey ...	5 Feb., "	390	4.4	20.10	

Rainfall for the Month, 166 points.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, OCTOBER, 1922.

The report by the principal (Mr. Cuthbert Potts) on the egg-laying competition of the Queensland Agricultural College at Gatton for October, states:—Extremely hot winds were experienced during the month, and these considerably upset the laying of some of the heavy breeds and made them resort to the broody coops. In the light section the highest scores for the month were:—N. A. Singer, 168; C. H. Singer, 166; and R. Gill, 158 eggs. In the heavy breeds, R. Burns came first with 158; C. C. Dennis 140 next, followed by E. F. Dennis with 136 eggs. Mr. N. A. Singer's B. bird finished her last month's break of 52, and Mr. R. Burn's D. bird has an unbroken run 23 eggs to her credit. The following are the individual scores:—

Competitors.	Breed.	Oct.	Total.
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LIGHT BREEDS.

*N. A. Singer	White Leghorns	...	168	915
C. H. Singer	Do.	...	166	882
*W. and G. W. Hindes	Do.	...	148	834
*Bathurst Poultry Farm	...	...	...	Do.	...	146	769
*T. Fanning	...	...	...	Do.	...	141	735
*G. Trapp	...	...	...	Do.	...	151	733
*R. Gill	...	...	...	Do.	...	158	732
*W. A. Wilson	...	...	...	Do.	...	143	728
*Mrs. L. Andersen	...	...	...	Do.	...	145	726
J. H. Jones	...	...	...	Do.	...	143	726
*S. L. Grenier	...	...	...	Do.	...	149	726
*J. M. Manson	...	...	...	Do.	...	149	721
*W. Becker	...	...	...	Do.	...	147	711
*H. P. Clarke	...	...	...	Do.	...	151	706
A. G. C. Wenck	...	...	...	Do.	...	135	704
*J. W. Newton	...	...	...	Do.	...	154	694
*G. Williams	...	...	...	Do.	...	136	676
*R. C. Cole	...	...	...	Do.	...	144	676
*O. Goos	...	...	...	Do.	...	138	669
*C. Goos	...	...	...	Do.	...	144	665
*Oakleigh Poultry Farm	...	...	...	Do.	...	148	659
*H. Fraser	...	...	...	Do.	...	147	657
*Mrs. R. Hodge	...	...	...	Do.	...	139	648
B. Hawkins	...	...	...	Do.	...	121	642
*J. W. Short	...	...	...	Do.	...	140	627
*R. C. J. Turner	...	...	...	Do.	...	155	627
*M. F. Newberry	...	...	...	Do.	...	151	623
J. Purnell	...	...	...	Do.	...	113	623
*Mrs. E. White	...	...	...	Do.	...	133	615
*C. M. Pickering	...	...	...	Do.	...	138	611
*Thos. Taylor	...	...	...	Do.	...	134	611
A. Maslin	...	...	...	Do.	...	100	606
N. J. Nairn	...	...	...	Do.	...	134	601
*F. Birchall	...	...	...	Do.	...	145	593
T. H. Craig	...	...	...	Do.	...	116	592
E. Stephenson	...	...	...	Do.	...	133	583
*E. A. Smith	...	...	...	Do.	...	125	570
G. F. Richardson	...	...	...	Do.	...	121	569
E. Symons	...	...	...	Do.	...	124	561
B. C. Bartlem	...	...	...	Do.	...	120	554
A. Anders	...	...	...	Do.	...	127	520
H. Trappett	...	...	...	Brown Leghorns	...	132	501
Brampton Poultry Farm	...	...	...	White Leghorns	...	113	488
Parisian Poultry Farm	...	...	...	Brown Leghorns	...	112	332

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Oct.	Total.
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	158	808
*A. E. Walters	Do.	131	777
*T. Hindley	Do.	130	734
*R. Holmes	Do.	123	716
*H. M. Chaille	Do.	110	706
Mrs. A. Kent	Do.	122	685
*C. C. Dennis	Do.	140	685
Jas. Hutton	Do.	120	676
*E. F. Dennis	Do.	136	651
Mrs. A. E. Gallagher	Do.	128	637
R. Iunes	Do.	136	625
*Jas. Potter	Do.	108	603
H. B. Stephens	Do.	145	587
W. Becker	Chinese Langshans ...	123	570
*Rev. A. McAllister	Black Orpingtons ...	100	570
Mrs. L. Maund	Do.	100	569
V. J. Rye	Do.	104	556
C. Doan	Do.	127	554
Wambo Poultry Farm	Do.	104	554
*Parisian Poultry Farm	Do.	115	549
Jas. Hitchcock	Do.	113	543
C. Rosenthal	Do.	109	497
W. C. Trapp	Do.	73	430
R. Burns	Silver-laced Wyandottes	92	427
*J. E. Smith	Barred Rocks	87	387
Miss L. Hart	Rhode Island Reds ...	113	290
Total ... ..	...	9,125	44,127

* Indicates that the pen is being single tested.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
N. A. Singer	136	171	143	156	154	155	915
W. and G. W. Hindes	149	133	144	134	147	127	834
Bathurst Poultry Farm	103	108	137	139	153	127	769
T. Fanning	91	150	132	132	151	79	735
Geo. Trapp	133	113	118	131	114	124	733
R. Gill	135	131	137	117	100	112	732
W. A. Wilson	118	112	101	134	127	136	728
Mrs. L. Andersen	144	99	126	119	118	120	726
S. L. Grenier	121	89	127	127	129	133	726
J. M. Manson	122	108	128	106	135	122	721
W. Becker	115	90	130	117	124	135	711
H. P. Clarke	121	103	124	130	112	116	706
J. W. Newton	138	116	131	96	123	90	694
G. Williams	106	116	130	113	110	101	676
R. C. Cole	128	114	126	86	111	111	676
O. Goos	111	95	123	132	117	91	669
C. Goos	87	97	100	122	143	116	665
Oakleigh Poultry Farm	122	102	114	98	99	124	659
H. Fraser	113	122	112	100	96	114	657
Mrs. R. Hodge	133	81	109	102	127	96	648
J. W. Short	108	104	124	88	90	113	627

EGG-LAYING COMPETITION—continued.
DETAILS OF SINGLE HEN PENS—continued.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS—continued							
R. C. J. Turner	113	95	118	112	110	79	627
M. F. Newberry	113	82	74	133	97	124	623
Mrs. E. White	117	40	123	79	134	122	615
C. M. Pickering	124	120	78	97	108	84	611
Thos. Taylor	121	90	107	103	100	90	611
F. Birchall	102	113	74	62	128	114	593
E. A. Smith	107	87	110	101	79	86	570

HEAVY BREEDS.

R. Burns	127	136	121	147	140	137	808
A. E. Walters	130	118	105	130	151	143	777
T. Hindley	103	125	79	166	162	99	734
R. Holmes	91	149	121	120	109	126	716
H. M. Chaille	135	115	132	110	126	88	706
C. C. Dennis	112	126	118	102	122	105	685
E. F. Dennis	108	107	131	56	120	129	651
J. Potter	98	100	111	100	119	75	603
Rev. A. McAllister ..	101	117	123	71	39	119	570
Parisian Poultry Farm ..	68	91	103	69	107	111	549
J. E. Smith	43	80	54	54	72	84	387
Miss L. Hart	55	58	45	57	27	48	290

CUTHBERT POTTS, Principal.

HOME TANNING—II.*

Numerous requests have reached the Department of Agriculture and Stock for directions for tanning hides on a small scale. Usually the tanning of a few hides or skins by inexperienced persons or those lacking adequate facilities cannot be recommended from the view point either of national economy or of individual profit. Sometimes, however, circumstances arise when a knowledge of tanning is of particular value on the farm. From time to time various methods of tanning have been described in the Journal. The latest information, containing possibly some new ideas, we have embodied in D.C. 230 of the U.S. Department of Agriculture on "Home Tanning," issued in July of this year, and from which the following notes are abstracted. The first part was published in the November Journal.—Ed.

CHROME-TANNED LEATHER.

Read the directions through before starting this work.

For many purposes chrome-tanned leather is considered to be as good as the more generally known bark- or vegetable-tanned leather. The chrome process, which requires only a few weeks as against as many months for the bark-tanning process, derives its name from the use of chemicals containing chromium or "chrome." It is a chemical process requiring care and attention. It is felt, however, that by adhering strictly to the directions here given, never disregarding details which may seem unimportant, a satisfactory and serviceable leather can be produced in a comparatively short time. The saving in time seems sufficient to justify a trial of the procedure.

Slaking Lime.

For each hide, and for not more than three small skins, put 8 pounds of lump, burnt, or caustic lime in a clean half barrel, wooden tub, or bucket, of at least 5 gallons capacity. Use only good-quality lime, free from dirt and stones

*Department Circular 230, by R. W. Frey, I. D. Clarke, and F. P. Veitch, Bureau of Chemistry, United States Department of Agriculture (July, 1922).

and never air-slaked. To the lime add about 1 quart of water. As the lime begins to slake, add more water, a little at a time, to keep the lime moist; do not pour in enough water to quench the slaking. After the lime appears to be slaked, stir in 2 gallons of clean water. Do all this just exactly as you would make whitewash. Slake the lime on the same day that you start soaking the hide or skin, and keep the limewater covered with boards or sacks until ready to use.

If available, fresh hydrated lime, not air-slaked, may be used instead of slaking burnt or caustic lime. In this case use 10 pounds in 4 or 5 gallons of water.

Soaking and Cleaning.

If the hide has been salt-cured, shake it vigorously to remove most of the salt. Spread it out, hair side down, and trim off the tail, the head back of the ears, shanks, and all ragged edges.

Now swing the hide or skin, hair side up, lengthwise, over a smooth log or board, and, with a sharp knife, split it from neck to tail, straight down the backbone line, into two half hides, or "sides." If the hide is large or "spready," it is more convenient to split each side lengthwise into two strips, making the strip with the backbone edge about twice as wide as the belly strip. Thus a whole hide will give two sides or four strips. In these directions the word "side" should be taken to mean either side or strip, as the case may be.

For a medium or large hide fill a clean 40- to 50-gallon barrel with clean, cool water; for a small skin a half-barrel or tub may be used. Hang the sides over sticks or pieces of rope and suspend them in the barrel of water to soak for two or three hours. Stir them about frequently to soften, loosen, and wash out the blood, dirt, manure, and salt. (The sticks or pieces of rope may be held in the proper position by tying a loop of cord on each end and catching the loops over nails in the outside of the barrel near the top.) After soaking for about three hours, take out the sides and place them, one at a time, hair side up, over a "beam." (A ready-made beam can be purchased, but a fairly satisfactory one can be made from a very smooth slab, log, or thick planed board, from 1 to 2 feet wide and 6 to 8 feet long. The slab or log is inclined, with one end resting on the ground and the other extending over a box or trestle so as to be about waist high.) With the side lying hair side up over the beam, scrub off all dirt and manure, using if necessary a stiff brush; then wash off with several bucketfuls of clean water.

Now turn the side over, flesh side up, and scrape or cut off any flesh remaining. Work over the entire flesh side with the back edge of a drawing or butcher knife, held firmly by both ends while pushing away from you hard against the hide or skin. Wash off with a bucket or two of clean water. This working over should always be done, as it helps to soften the hide. Refill the soak barrel with clean, cool water, and hang the sides in it as before, working them about frequently until they are soft and flexible. A green or fresh hide usually needs to be soaked for not more than 12 to 24 hours; a green salted hide for not more than 24 to 48 hours.

When the sides are properly softened, that is, about like a fresh hide or skin, throw them over the beam, and again work over the flesh side with the back edge of a knife as directed before.

Hides and skins must be soft, pliable, and clean all over before being put into the lime.

Liming to Remove the Hair.

Wash out the soak barrel and pour into it all of the slaked lime. Nearly fill the barrel with clean, cool water, and stir thoroughly. Hang the sides again over the short sticks or pieces of rope, hair side out, and suspend them in the barrel so that they are completely covered by the limewater. Cover the barrel with boards or bags. Plunge the hides and stir the limewater three or four times each day until the hair will come off easily. This will take from 6 to 10 days in summer and from 6 to 16 days in winter. When thoroughly limed, the hair can be rubbed off readily with the hand. Early in the liming process it will be possible to pull out the hair, but the hide must be left in the lime until the hair comes off by rubbing over with the hand.

When limed, throw the sides, hair side up, over the beam, and, with the back edge of a drawing or butcher knife, held nearly flat against the hide, push off the hair from all parts of the hide. If the hide is sufficiently limed, a curdy or cheesy layer of skin rubs off with the hair. If this layer does not rub off, the sides must be returned to the limewater. Now thoroughly work over the grain or hair side with a dull-edged tool to get out as much lime, grease, and dirt as possible. Then turn the side over and do the same thing, being sure to remove all fleshy matter.

Shave down to the hide itself, but be careful not to cut into it. Remove the flesh by scraping or by using a sharp knife with a motion like that of shaving your face. Rinse off both sides of the hide with clean water.

For sole, belting, and harness leathers, soak and wash the hide in cool water for about six hours, changing the water four or five times, and then proceed as directed under "Drenching."

For strap, upper, and thin leathers, put the limed white hide or skin into a wooden or fibre tub of clean, lukewarm (about 90 deg. F.) water for four to eight hours, depending upon the size of the hide or skin, and stir about occasionally. Be sure not to get the water too hot, never so hot that it is uncomfortably warm to the hand. After this treat the hide or skin as directed under "Drenching."

The lime, limewater, sludge, and fleshings from the liming process may be used as fertilizer, being particularly good for acid soils. The hair, as it is scraped from the hide, may be collected separately, and, after being rinsed several times, may be used in plastering. If desired, it can be thoroughly washed with many changes of water until absolutely clean and, after drying out in a warm place, can be used for padding, upholstering, insulation of pipes, etc.

Drenching.

Drenching is necessary to remove the lime which the hide or skin still contains and to make it soft and pliable.

For each large hide or skin buy 3 ounces of U.S.P. lactic acid (or 9 ounces of tannery 22 per cent. lactic acid). Nearly fill a clean 40- to 50-gallon barrel with clean, cool water, and stir in the lactic acid, mixing thoroughly with a paddle. Suspend the sides in this solution for 24 hours or overnight, plunging them up and down occasionally.

For light skins, weighing less than 15 pounds, use only 1 ounce of U.S.P. lactic acid in about 20 gallons of water.

If lactic acid cannot be obtained, use 1 pint of vinegar for every ounce of lactic acid. An effort should be made to get the lactic acid, for vinegar will not be as satisfactory, especially for the medium and smaller skins.

After drenching, work over both sides of the hide or skin, as directed under "Liming."

For sole, belting, and harness leathers, hang the sides in a barrel of cool water overnight; then proceed as under "Tanning."

For thin, softer leathers from the small skins, simply rinse off with water after working from the drench. Do not soak in water overnight, but proceed to the "Tanning."

Tanning.

The tanning solution should be made up at least two days before it is to be used; that is, not later than when the hide or skin is taken from the limewater for the last time.

Remember that this is a chemical process and all materials must be of good quality and accurately weighed, and that the specified quantities of water must be carefully measured.

The following chemicals are required: Chrome alum (chromium potassium sulphate crystals); soda crystals (crystallized sodium carbonate); and common salt (sodium chlorid). Insist upon pure chemicals of U.S.P. quality. Get them from the nearest drug store or find out from it the address of a chemical manufacturing concern which can supply you.

For each hide or skin weighing over 30 pounds, use the following quantities for the stock chrome solution:

Dissolve $3\frac{1}{2}$ pounds of soda crystals (crystallized sodium carbonate) and 6 pounds of common salt (sodium chlorid) in 3 gallons of warm, clean water in a wooden or fibre bucket. The soda crystals must be clear or glasslike. Do not use the white crusted lumps. *This is important.*

At the same time dissolve, in a large tub or half barrel, 12 pounds of chrome alum (chromium potassium sulphate crystals) in 9 gallons of cool, clean water. This will take some time to dissolve and will require frequent stirring. Here again it is important to use only the very dark, hard, glossy purple or plum-coloured crystals of chrome alum, not the lighter, crumbly, dull lavender ones.

When the chemicals are dissolved, which can be told by feeling around in the tubs with a paddle, pour the soda-salt solution slowly in a thin stream into the

chrome-alum solution, stirring constantly. Take at least 10 minutes to pour in the soda solution. This should give one solution of about 12 gallons which is the *stock chrome solution*. Keep this solution well covered in a wooden or fibre bucket, tub, or half barrel.

To start tanning, pour one-third (4 gallons) of the stock chrome solution into a clean 50-gallon barrel and add about 30 gallons of clean, cool water; that is, fill the barrel about two-thirds full. Thoroughly mix the solution in the barrel and suspend in it the sides taken from the drenching. Work the sides about and stir the solution frequently, especially the first two or three days. This helps to make the sides evenly coloured and should be done every hour or so throughout the first day. Keep the suspended sides as smooth as possible.

After three days, temporarily remove the sides from the barrel, add one-half of the remaining stock chrome solution, thoroughly mixing it with that in the barrel, and again hang in the sides. Move the sides about and stir the solution three or four times each day.

After three more days, again temporarily remove the sides, and pour into the barrel the rest of the stock chrome solution, thoroughly mixing it with that in the barrel, and again hang in the sides. Move the sides about and stir frequently as before.

After three or four days in this solution, cut off a small piece of the thickest part of the hide, generally in the neck, and examine the freshly cut edge of the piece. If the hide seems to be evenly coloured greenish or bluish all the way through, the tanning is about finished. Boil the small piece which you have just cut off in water for a few minutes. If it curls up and becomes hard or rubbery, the tanning is not completed and the sides must be left in the tanning solution for a few days more, or until a small piece when boiled in water is changed little if at all.

The foregoing quantities and directions have been given for a medium or large hide. For smaller hides and skins the quantities of chemicals and water can be reduced. For each hide or skin weighing less than 30 pounds, or for two or three small skins together weighing not more than 30 pounds, the quantities of chemicals may be cut in half, giving the following solutions:

For the soda-salt solution dissolve $1\frac{1}{2}$ pounds of soda crystals (crystallized sodium carbonate) and 3 pounds of common salt (sodium chlorid) in $1\frac{1}{2}$ gallons of clean water.

For the chrome-alum solution dissolve 6 pounds of chrome alum (chromium potassium sulphate crystals) in $4\frac{1}{2}$ gallons of cool, clean water.

When the chemicals have dissolved pour the soda-salt solution slowly into the chrome-alum solution as already described. This will give one solution of about 6 gallons which is the *stock chrome solution*. For the lighter skins tan with this solution, exactly as directed for medium and large hides, adding one-third, that is, 2 gallons of this stock chrome solution, each time, and begin to tan in about 15 gallons of water instead of 30 gallons. Follow the directions already given as to stirring, number of days, and testing to determine when tanning is completed. Very small, thin skins probably will not take as long to tan as will the large hides. The boiling-water test is very reliable for showing when the hide is tanned.

Washing and Neutralizing.

When the hide or skin is tanned, take the sides out of the tanning solution and put them in a barrel of clean water. The barrel in which the tanning was done can be used after it has been thoroughly washed. (When emptying the tanning barrel be sure to carefully dispose of the tanning solution. While this solution is not poisonous to the touch, it would probably be fatal to the animals and stock of the farm should they drink it, and is furthermore harmful to the soil.) Wash the sides in about four changes of water. For medium and large hides, dissolve 2 pounds of borax in about 40 gallons of clean water and soak the sides in this solution overnight. For smaller hides and skins, weighing less than 25 pounds, use 1 pound of borax in about 20 gallons of water. The sides or skins should be moved about in the borax solution as often as feasible. After soaking overnight in the borax solution, remove the sides and wash them for an entire day, changing the water 5 or 6 times. Take the sides out, let the water drain off, and proceed as under "Dyeing black." If it is not desired to blacken the leather, proceed as under "Oiling and finishing."

Dyeing Black.

Water-soluble nigrosine.—One of the simplest and best means of dyeing black is with nigrosine. Make up the dye solution in the proportion of a half ounce of water-soluble nigrosine dissolved in $1\frac{1}{2}$ pints of water. Be sure to get water-soluble

nigrosine. Evenly mop or brush this solution over the wet chrome leather after draining as already directed and then proceed as directed under "Oiling and finishing."

Iron liquor and sumac.—If water-soluble nigrosine cannot be obtained, a fairly good black can be produced with iron liquor and sumac. To make the iron liquor, mix clean iron filings or turnings with a half gallon of good vinegar and let stand for several days. See that there are always some undissolved filings or turnings in the vinegar. For a medium or large hide, put 10 to 15 pounds of dried, crumbled sumac leaves in a barrel containing 35 to 40 gallons of warm water. Stir well, and, when cool, hang in it the wet, chrome-tanned sides. Leave the sides in this solution for about two days, plunging and mixing the solution frequently. Take out the sides, rinse off all particles of sumac, and evenly mop or brush over with the iron liquor. Rinse off the excess of iron liquor and put the sides back in the sumac overnight. If not sufficiently black the next morning, mop over again with iron liquor, rinse, and return to the sumac solution for a day. Take out of the sumac, rinse well, and scrub thoroughly with warm water. Finally wash the sides for a few hours in several changes of water.

While both of these formulas for blackening have been given, it is recommended that water-soluble nigrosine be used whenever possible, as the iron liquor and sumac formula is somewhat troublesome and may produce a cracky grain. After blackening, proceed as under "Oiling and finishing."

Oiling and Finishing.

Thin leather.—Let the wet tanned leather from the dyeing, or from neutralizing if not dyed, dry out slowly until very damp. Then go over the grain side with a liberal coating of neat's-foot or cod oil. While still damp, tack the sides out on a wall or tie in a frame, being sure to pull out tight and smooth, and leave until dry. When dry, take down and dampen well by dipping in warm water or by rolling up in wet sacking or burlap. When uniformly damp and limber, go over the sides with a "slicker," working them out on the grain side in all directions. (A slicker can be made from a piece of copper or brass about one-fourth inch thick, 6 inches long, and 4 inches wide. One long edge of the slicker is mounted in a wooden handle and the other long edge, well rounded, is used to work over the sides by pushing hard against them and away from yourself.) After slicking, it may be necessary to "stake" the leather. That is done by pulling the damp leather vigorously back and forth over the end of a small smooth board about 2½ feet long, 6 inches wide, and 1 inch thick, fastened upright and braced to the floor or ground. The top end of the board must be shaved down to a wedge shape, with the edge not more than one-eighth inch thick and the corners well rounded. Pull the sides or skins backward and forward over this edge, flesh side down, exactly as a cloth is worked back and forth in polishing shoes. Let the sides dry out thoroughly again, and, if not sufficiently soft and pliable, dampen with water, apply more oil, and slick and stake as before. The more time given to slicking and staking, the smoother and more pliable the leather will be.

Thick leather.—Thick leather from the larger hides is oiled and finished in a slightly different manner. For harness and strap leather let the tanned sides, dyed if desired, dry down until still quite damp. Then slick over the grain side thoroughly and apply a liberal coating of neat's-foot or cod oil. Tack on a wall or tie in a frame, stretching the leather out tight and smooth, and leave until dry. Then take down, dampen with warm water until limber and pliable, and apply to the grain side a thick coating of a dubbin made by melting together about equal parts of cod oil and tallow or neat's-foot oil and tallow. This dubbin when cool must be soft and pasty but not liquid. If too nearly liquid, add more tallow. Hang up the sides again and leave until thoroughly dried. When dry, remove the tallow from the surface of the leather by working over with the slicker. If more grease in the leather is desired, dampen again and apply another coating of the dubbin. When again dry, slick off the tallow and thoroughly work over all parts of the leather with the slicker. Rubbing over with sawdust will help to take up any surface oiliness.

Chrome-tanned leather is inclined to be stretchy, so that in cutting up the leather for use in harness, straps, reins, and similar articles it is best to first take out most of the stretch.

Chrome leather for shoe soles must be heavily greased, or, in other words, waterproofed, unless it is to be worn in extremely dry sections of the country. Waterproofing may be done after repairing the shoes by setting them in a shallow pan of oil or grease, so that just the soles are covered by the grease. The soles should be dry before setting them in the melted grease. Melted paraffin wax will do, although it makes the soles stiff. The simple formulas given on page 11 are satisfactory for waterproofing chrome sole leather.

ALUM-TANNED LACE LEATHER.

Lace leather should be made from good sound hides, preferably steer hides. The weight of the hides used may vary from 20 to 40 pounds, depending upon the thickness of leather desired.

Slacking Lime.

Place about 6 pounds of burnt or caustic lime in a clean wooden tub. Add about 1 quart of water. As the lime begins to slake, add more water, a little at a time, to keep the lime moist; do not pour in water enough to quench the slaking. After the lime appears to be slaked, stir in a gallon or two of clean water. Do all this just exactly as you would make whitewash. Slake the lime the day you start soaking the hide, and keep the tub covered until used.

If burnt lime is not available, fresh hydrated lime (not air-slaked) may be used. In this case stir 8 pounds of hydrated lime into a barrel of water and proceed as directed under "Liming."

Soaking and Cleaning.

If the hide has been salted, shake vigorously to remove most of the salt. Spread it out, hair side down, and trim off the tail, head, ears, all ragged edges, and shanks.

Place the hide, hair side up, lengthwise, over a log or board, and, with a sharp knife, cut it from nose to tail, straight down the backbone line, into 2 "sides." It will be more convenient in subsequent handling, especially when the hide is large, to then split each side lengthwise into 2 strips. The back strip will make the better leather and should be about twice as wide as the belly strip.

Fill a barrel with clean, cool water. Place the strips in the barrel to soak for two or three hours, with frequent stirring, to soften the sides and loosen and soak out the blood, dirt, manure, and salt. Take the strips out of the barrel and place them, one at a time, hair side up, on a smooth slab, log, or thick planed board, from 1 to 2 feet wide and 6 to 8 feet long, one end of which rests on the floor and the other extends over a box or trestle so as to be about waist high. Scrub off all dirt and manure, and wash with several bucketfuls of clean water.

Now turn the strip over, flesh side up, and carefully cut off most of the meat or flesh. Work over the entire flesh side with the back edge of a drawing or butcher knife, held firmly by both ends, while pushing away from you hard against the strip. Wash off with a bucket or two of clean water. This working over should always be done. Refill the barrel with clean, cool water and put the strips back. Pull them up and stir frequently until they are soft and flexible. A green hide usually needs to be soaked for not more than 10 to 20 hours; a green salted hide for not more than 20 to 40 hours.

When the strips are properly softened, throw them over the slab or beam and thoroughly scrape off all remaining flesh or meat with the back edge of the drawing or butcher knife. It is of the greatest importance to remove all of this meat. When it can not be scraped off, cut it off, but be very careful not to cut into the hide itself. Even should there appear to be no flesh to take off and nothing appears to be removed, it is necessary to thoroughly work over the flesh side in this way with the back of the knife. Finally wash off with a bucketful of clean water.

Liming to Remove the Hair.

Wash out the soak barrel. Pour in the slaked lime; nearly fill the barrel with clean, cool water; and stir thoroughly. Hang each strip, hair side up, over a separate piece of rope and suspend in the limewater. Fasten the ends of the ropes to the barrel so that the strips are entirely covered by the limewater, and cover the barrel with a bag or board. Pull up the strips and stir the lime three or four times each day until the hair will rub off easily from all parts of each strip. This will take from 5 to 8 days in summer and from 6 to 16 days in winter.

When limed, throw the strips, hair side up, over a smooth, slanting slab or board, and, with the back of a drawing or butcher knife, held nearly flat against the hide, push the hair off. If the hide is sufficiently limed, a curdy or cheesy layer of skin rubs off with the hair. If this layer does not thus rub off, the strips must be returned to the limewater. After removing the hair, put the strips back in the lime for another day, until any fine hairs that may remain can be easily rubbed off. Now thoroughly work over the grain or hair side with the back of the knife.

to "seud" out as much lime, fat, and dirt as possible. Turn the strip over and do the same thing, being sure to remove any meat that may remain on the hide. Then throw the strips into a wooden or fibre tub of clean, lukewarm water and let them remain for from six to eight hours, stirring occasionally.

Drenching.

Drenching is necessary to remove the lime which the hide still contains and to make it soft and pliable.

Buy 3 ounces of U.S.P. lactic acid at the drug store. Nearly fill a clean barrel with clean, cool water, and stir the 3 ounces of lactic acid into it with a clean paddle. Take the strips out of the tub of water, throw them into the barrel of acid, and pull up and stir frequently for 10 to 12 hours or overnight. Now work over or "seud" thoroughly both sides of each strip as is directed under "Liming," and put them in a tub of cool, clean water.

Lactic acid helps to make a softer leather, but if it cannot be bought use $\frac{1}{2}$ gallon of vinegar instead.

Tanning.

While the strips are being drenched, thoroughly wash out the barrel in which the hide was limed. Place in it 15 gallons of clean water and 12 pounds of ammonia alum, or potash alum, and stir frequently until it is completely dissolved.

Dissolve 3 pounds of washing soda (crystallized sodium carbonate) and 6 pounds of salt in 5 gallons of cold, clean water in a wooden bucket. The soda crystals must be clean and transparent (glasslike). Do not use white opaque lumps.

Now pour the soda solution into the alum solution in the barrel very, very slowly, stirring the solution in the barrel constantly. Take at least 10 minutes to pour in the soda solution in a small stream. If the soda is poured in rapidly the solution will become milky, and it will not tan. The solution should be cool, and enough water should be added to nearly fill the barrel.

Hang each well-washed strip from the drench in the alum-soda solution. Pull up the strips and stir the solution six to eight times each day. (Do not put the bare hands in the liquor if they are cut or cracked or have sores on them. The alum will make them worse.)

After six or seven days, remove the strips from the alum-soda solution and rinse well for about one-fourth hour in clean, cold water. Drain on clean boards for one-half hour; then hang up by one edge to dry in a moderately warm place free from draughts. Turn the strips every hour, so that first one edge and then the other is up. If this is not done, the lower edge may become cracky. Be sure not to let the strips dry completely and become stiff. If one part of the strip dries faster than another, which is especially likely to occur on the edges, moisten these drier places with water.

While the strips are yet damp but have become somewhat stiff, about like a bridle or driving rein, and can be sharply bent without cracking, begin to work or "stake" them. That is, pull them vigorously back and forth lengthwise over the end of a small smooth board, about $2\frac{1}{2}$ feet long, 6 inches wide, and 1 inch thick, fastened upright and braced to the floor or ground. The top end of the board must not be more than one-eighth inch thick and the corners must be well rounded. Pull the strip backward and forward, flesh side down, exactly as a cloth is worked backward and forward in polishing shoes. Do this vigorously, but do not cut holes in the hide. The strips must be staked very thoroughly all over in order to make them pliable and soft. The more time given to staking, the more pliable the leather will be. The staking must be done in a clean place where the strips will not get dirty.

After staking, lay the strips flat on a large, low table or on smooth boards, grain side down, and go over the flesh side thoroughly with the back of the knife, or better, with a piece of wedge-shaped hickory, about 6 inches square and one-half inch thick at the head of the wedge. The narrow end of the wedge should be from one-thirty-second to one-sixteenth inch thick and very smooth. Work the flesh side of the hide with this slicker, holding it in both hands by the top and pushing away from you, to remove all adhering flesh and dirt. Turn the strip over and work the grain side also.

Melt together 3 pounds of tallow and 1 pint of neat's-foot, cod, or fish oil. While the strips are still soft and uniformly damp (if they are not damp at this stage, cover them in damp sawdust until they are uniformly moist all over, but not wet). Rub a heavy coat of the melted grease mixture all over both sides of each

strip. This should be done in a very warm place, and the grease should be as hot as the hand can bear without discomfort.

Roll the greased strips together and keep them in a very warm place for two or three days. Unroll and again stake thoroughly. If too dry and stiff to stake readily, cover them with damp sawdust until they are soft enough. After drying, if the leather is not sufficiently soft and pliable, again apply dubbin to both sides exactly as before, and lay away rolled for two days. Again stake and then work over both sides with the hickory slicker to more thoroughly work in the grease and remove the excess.

The strips should now be very supple and pliable, even after they are thoroughly dried out. If they are not, they must be vigorously and thoroughly staked all over and redubbed with oil only, staked, and slicked, until they remain soft and pliable. Thorough, vigorous staking of the nearly dry leather is absolutely essential to produce the desired softness and pliability. When dry, soft, and pliable, the leather is ready for use.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF OCTOBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING OCTOBER 1922 AND 1921 FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Oct.	No. of Years' Records.	Oct., 1922.	Oct., 1921.		Oct.	No. of Years' Records.	Oct., 1922.	Oct., 1921.
<i>North Coast.</i>	In.		In.	In.	<i>South Coast—continued:</i>	In.		In.	In.
Atherton ...	0.99	21	0.87	2.65	Nambour ...	3.15	26	0.49	1.82
Cairns ...	2.01	40	1.33	3.96	Nanango ...	2.31	40	1.40	0.99
Cardwell ...	2.08	50	1.69	5.31	Rockhampton ...	1.90	35	2.47	3.35
Cooktown ...	1.15	46	0.10	1.59	Woodford ...	2.61	35	2.00	1.20
Herberton ...	0.96	35	0.58	2.89					
Ingham ...	1.63	30	3.30	4.91	<i>Darling Downs.</i>				
Innisfail ...	3.05	41	2.90	5.59	Dalby ...	2.11	52	1.35	1.36
Mossman ...	3.21	14	1.96	4.10	Emu Vale ...	2.32	26	1.11	1.78
Townsville ...	1.28	51	1.89	5.78	Jimbour ...	1.85	34	1.74	1.02
					Miles ...	1.99	37	1.64	1.29
<i>Central Coast.</i>					Stanthorpe ...	2.63	49	1.55	4.16
Ayr ...	1.02	35	0.95	3.57	Toowoomba ...	2.66	50	1.50	1.33
Bowen ...	1.08	51	0.18	3.41	Warwick ...	2.35	57	1.59	2.57
Charters Towers ...	0.72	40	0.05	3.29					
Mackay ...	1.87	51	1.76	1.79	<i>Maranoa.</i>				
Proserpine ...	1.55	19	0.97	2.88	Roma ...	1.75	48	3.40	1.87
St. Lawrence ...	1.88	51	0.23	2.08					
					<i>State Farms, &c.</i>				
<i>South Coast.</i>					Bungeworgorai ...	1.31	8	2.27	1.23
Biggenden ...	2.30	23	1.22	1.83	Gatton College ...	2.25	23	...	0.67
Bundaberg ...	2.14	39	0.80	0.80	Gindie ...	1.39	23	2.15	0.40
Brisbane ...	2.62	71	2.10	1.36	Hermitage ...	1.99	16	1.59	2.50
Childers ...	2.48	27	0.33	1.47	Kairi ...	1.26	8	...	2.66
Crohamhurst ...	3.45	29	1.40	1.93	Sugar Experiment Station, Mackay	1.71	25	1.45	1.60
Esk ...	2.43	35	4.78	1.08	Warren ...	2.60	8	0.75	1.10
Gayndah ...	2.41	51	0.73	0.89					
Gympie ...	2.76	52	0.50	2.61					
Glasshouse Mts. ...	2.86	14	1.80	11.67					
Kilkivan ...	2.67	43	0.18	1.97					
Maryborough ...	2.74	51	0.29	0.73					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for October this year, and for the same period of 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
State Meteorologist.

FACTORS IN AN IDEAL RATION.

By J. McLEAN WILSON.

Mr. Wilson is an American authority on stock feeding and breeding and the owner of a Holstein herd. He is in Australia on a health tour, and is at present visiting Queensland.—Ed.

In actually computing a ration for a given purpose there are seven factors that should be considered—

1. Amount of dry matter.
2. Digestibility of the ration.
3. The nutritive ratio.
4. Variety of the ration.
5. Suitability of the feeds to the animal.
6. Palatability of the ration.
7. Cost of the ration.

Amount of Dry Matter.

The amount of dry matter in the ration serves to regulate the relative amounts of roughage and concentrates. By roughage are meant the coarser feeds, such as hay, corn fodder, silage; by concentrates are meant the grains, and the other feeds in the ration that are low in their percentage of fibre and water, and high in their percentage of total digestible nutrients. Ordinarily, in rations for cattle and sheep, if two-thirds of the dry matter is from feeds classed as roughage, and one-third from concentrates, the rations will be bulky enough to distend the digestive organs, so as to give the best results. For horses and swine, more dry matter should be in the grains.

Digestibility of the Ration.

A little more than two-thirds of the dry matter in the ration should be digestible, that is, the amount of total digestible nutrients should be at least two-thirds as much as the dry matter. This relation will change with the purpose of the ration, and with the character of the feed. Any ration for productive purposes, however, which shows that the amount of total digestible nutrients is less than two-thirds as much as the amount of dry matter can be improved.

The Nutritive Ratio.

It will be noticed that the rations for growing animals and for milk production are 1:7 or narrower, while the rations for fattening and for labour may be somewhat wider. In none of the rations except in the case of the youngest animals does the nutritive ratio go below 1:4.5. Formerly, it was thought that feeders must calculate the nutritive ratio of "balance" the ration with much exactness. This is no longer considered to be necessary, due to further knowledge in respect to the functions of the nutrients and to the fact that the nutrient protein is not so expensive as in former years. If the nutritive ratio given for the purpose is considered to be the widest ration for the best results, and if no ration is made narrower than 1:4.5 except in the case of the youngest animals (which are growing new tissue very rapidly) the ration will be satisfactory.

Variety in the Ration.

All feeders of animals should provide variety in the ration. Variety stimulates the animal's appetite. Better results are obtained from a ration containing several feeds than from a ration limited in variety. A ration for any animal should have two different feeds in the roughage and three or more feeds in the concentrated part of the ration. These feeds should come from not less than three different plants.

Suitability of Feeds to the Animal.

The feeds in the ration should be suited to the animal and to the purpose for which the animal is fed. For example, wheat bran is not suitable for feeding hogs because of its bulk; wheat middlings are much to be preferred.

Palatability of the Ration.

The ration should be palatable if the best results in production are to be obtained. With dairy cows palatability is easily obtained by providing succulent feeds in the ration. The condition of the feed has much to do with its palatability. No musty nor damaged feed should be given to any animal.

Cost of the Ration.

Without doubt, the cost of the ration is the most important factor to be considered by the farmer. However, the other factors must not be sacrificed for cost in every case. A rough way, efficient in most cases, to choose feeds for the greatest economy in the ration is to calculate the cost of 100 lb. of total digestible nutrients in the different feeds available, then to choose those that will yield total digestible nutrients the cheapest—always taking into consideration the six other factors that have just been explained.

HEAVY COST OF FEEDING.

- A. Low yield.
- B. Extravagant feeding.
- C. Indiscriminate purchase of feeding stuffs.
- D. Bad management.

A. Calculations show that the more eggs a hen lays the cheaper becomes the cost per egg. Because a 300-egg hen does not require twice as much food, &c., as the 150-egg hen. The most economically managed animals are those that yield well on a normal ration, a matter mainly of *breeding* and *selection*.

Extravagant Feeding.

B. Cases have come under observation, during various investigations where animals of the same number—producing different quantities—but of the same breed and average weight have been fed the same daily allowance. One lot were apparently overfed, while on the other hand, the other lot may have been underfed. Oftimes overfeeding is the case frequently in the feeding of an excessive amount of green-stuff, or commonly named roughages, but more often in the excessive feeding of the foods. The practice of rationing individual animals according to their yield is year by year being more generally adopted.

Indiscriminate Purchase.

C. A farmer when buying should—*first*, know what he wants to buy; *second*, know comparative values. For instance, a food or blending of foods with a protein content of 20 per cent.—providing he is in the market for protein—at £18 per ton is cheaper than one with a protein content of 10 per cent. at £15 per ton. The same rule holds good in the purchase of food for other valuations, such as fat, fibre, &c.

Bad Management.

D. Being a feed expert it would be the height of folly to even offer suggestions as to the general management of your business, that's for others more proficient in the industry to do. Questions relating to feeds and feeding are therefore handled under the foregoing B. and C.

The principle reason for the low yield average in production throughout the world is the lack of knowledge as to the proper feeding of the animal to be fed. There are other reasons also, which may be stated—

1. Lack of ability on the part of the animal to convert food into profitable production.
2. Lack of the proper temperament, constitution, and capacity.
3. Lack of proper amounts of wholesome food.
4. Lack of proper kinds of food.
5. Lack of care and attention.
6. Lack of judgment on the part of the feeder, such as irregularity.
7. Lack of sufficient quantity of *pure* water.

PRODUCTION DEPENDENT ON FEEDING AS WELL AS INTELLIGENT BREEDING AND SKILFUL SELECTION. AVOID HAPHAZARD FEEDING. COMPOSITION OF THE ANIMAL BODY.

The animal body is made up of water and dry matter (ash or mineral matter, protein, carbohydrates, and fats) which comes from the food.

Water.

The animal body when it comes to the point of quantity is largely made up of water. From 40 to 85 per cent. of its gross weight, varying accordingly to its age and condition, consists of water. The water in the animal body serves four purposes: (1) It is a part of all bone and flesh; (2) it serves as a carrier of food from the digestive tract to body cells, wherever they may be located, or from those parts of the body where the food is put into suitable shape to be used by the cells; (3) water removes the wastes of the body through the perspiration and the urine; and (4) it equalises the temperature of the body.

Ash.

Ash or mineral matter is largely found in the bones or skeleton of the body, while other portions of the body may carry small quantities. From 2 to 5 per cent. of the gross weight of the frame is ash. The ash of the animal body consists largely of phosphate of lime. Since ash exists in plentiful quantities in most rations, it need not be considered in a ration, except for young stock or cows producing large quantities of milk.

Protein.

The protein is a very important constituent in the animal body, and contains from 12 to 19 per cent. nitrogen. The flesh, skin, bones (in part), casein and albumin of milk, vital organs, brains, nerves—in fact, the bodily mechanisms—are made up of proteins diluted, so to speak, with water, supported by the ash of the skeleton and rounded out with fat and with water. Protein is a compound made up largely of four elements, carbon, oxygen, hydrogen, and nitrogen.

Carbohydrates.

The carbohydrates of the body are made up of carbon, hydrogen, and oxygen. Very few carbohydrate substances exist in the body, except in the blood. These substances are taken from the blood to furnish the energy of the muscles and part of the heat of the body. The liver acts as a storehouse for carbohydrate and regulates the supply to the blood so that the amount of carbohydrates in the blood is kept uniform for properly supplying the muscles. It is also thought that the liver has the power to make carbohydrates from fats and the protein of the food, if the supply of carbohydrates is limited.

Fats.

These are distributed throughout the body and comprise from 6 to 30 per cent. of the live weight of animals. They consist of carbon, hydrogen, and oxygen, but contain no nitrogen. They consist of the above, and are used to supply energy to the cow and also furnish heat. The fats in the body of the cow are used as a storehouse for heat and energy. They are added to when the food supply is in excess of that needed by the animal for work or production, and they are drawn from when the food supply is short.

COMPOSITION OF FEEDS.

The composition of vegetable matter is made up in a way of substances similar to that of animal matter. Vegetable matter consists of water and dry matter (ash, protein, fat, and carbohydrates, which includes crude fibre and nitrogen free-extract). The dry matter or compounds in vegetable matter varies in proportion and somewhat in composition. In most cases these compounds are not in proper proportions for the best results, so it is necessary for the farmer to mix a number of these feeds to supply the animal with the desired nutrients. From the farmer's standpoint, only three of these food compounds need be considered, because the ash or mineral matter usually is present in sufficient amounts. These three compounds (called nutrients) are protein, carbohydrates, and fat.

Protein in Feeds.

The protein of vegetable matter is a compound composed mostly of carbon, hydrogen, oxygen, and nitrogen. This compound is used to keep up the protein of the body, such as replacing worn out tissues, building new tissues, for growth of hair, hoofs, horns, and for supplying the milk with casein and albumin. Protein cannot be produced in the animal body from carbohydrates and fats of foods.

If there is an excess of protein fed in the ration, it will be used in the production of heat and energy, thus serving the purpose of carbohydrates and fats. Feeds rich in protein are usually higher in price, and while it is always necessary to have a sufficient amount of protein in the ration, the heat and energy demands of the animal body can be more economically met by feeding carbohydrates and fats.

The amount of digestible protein in feed varies from less than 1 per cent. to more than 40 per cent.

Carbohydrates in Feeds.

Carbohydrate is a nutrient which differs from protein in that it does not contain nitrogen, but is made up largely of carbon, hydrogen, and oxygen. It is abundant in our common grasses, in the form of starch, sugar, fibre, &c., and is used by the animal to supply energy, heat, and fat in the body, and, in addition, used by the cow to supply sugar and fat in the milk. It is the cheapest nutrient in our feeds, because it is most abundant; also, it is used in larger quantities by the cow than protein or fat.

Fats in Feeds.

These compounds are made up of nearly the same elements as carbohydrates, and are used by the animal in about the same way. Fats differ from carbohydrates in that they have a heat energy value equal to about two and one-fourth times the energy of the same weight of carbohydrates.

SUMMARY.

The Importance of a Balanced Ration.

1. To support life; to maintain body temperature; to repair and replace body tissues; for the muscular activity of the vital processes.
2. To produce fat, flesh, or milk (production).
3. To perform labour (transform feed into milk).
4. To develop the fœtus.

Nutrients Needed.

1. Varies in different kinds of stock.
2. See nutritive ratios.

Calculating Rations.

1. Palatability.
2. Digestibility.
3. Bulk.
4. Variety.
5. Succulent.
6. Economical.
7. Nutritive ratio.
8. Plenty of protein.
9. Plenty of mineral matter.
10. Suitability.

Water.

Low water content means low production.

Event and Comment.

Cotton Pests—Occurrence on the Downs.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) recently made available a memorandum by the Government Entomologist and Vegetable Pathologist (Mr. H. Tryon) on the failure in growth of young cotton plants in the Darling Downs district. Mr. Tryon stated, respecting the reported Westbrook occurrence, that from the information available he was unable to arrive at the cause of the young plants being cut off just as they were coming through the ground, or being ring-barked if suffered to exist till of somewhat larger growth (P. Felt); for, although certain definite depredators were said to have been formerly implicated, this referred to a time some ten days prior to the visit of Mr. C. J. McKeon, Assistant Instructor in Agriculture, when the cotton no longer existed, and when specimens of the insect, spoken of as "wire worms," were undiscoverable by him. Concerning the cotton field on the farm of Mr. H. Dippel, at Middle Ridge, the foregoing statement, with but little variation, applied to this occurrence also. With regard to the cotton field on the farm of Mr. D. Dippel, in this case, Mr. C. J. McKeon found that the young plants to the extent of about 90 per cent. still survived. These (specimens of which were submitted) showed two forms of injury, associated in some instances. In the first place, a small injury in the main stem just below where level with the soil-surface, evidently wrought by some mandibulate insect; and, in the second, a browning and shrinkage of the stem just above and below the soil surface. It could not be affirmed what insect or insects perpetrated the structural injury remarked, for although Mr. McKeon was successful in finding two beetle larvae in the soil after diligent search these insects were only wire worms in appearance—not in reality—nor did they correspond to any known soil-frequenting harmful insect—species apparently inflicted here in some instances by the grub of a small beetle, *Gonocephalum*. The other destructive change remarked was not of parasitic fungus origin. It conformed, however, to what one would expect to find in young cotton that had experienced conditions favourable to its growth, and then high soil-temperatures; especially operative harmfully when the cultivation had been shallow and the surface allowed to cake. Mr. McKeon had been invited to inquire to what extent, if any, these meteorological factors prejudicially affect young cotton growth.

In the case of the occurrence at Wellecamp, on the farm of Mr. J. E. Horrocks, certain young cotton plants that had survived exhibited aphids and symptoms of aphid attack, as shown by samples brought under his (Mr. Tryon's) notice; others manifested the collar-injury above referred to. Mr. McKeon again, in the case of this crop, elicited a history of insect attack to the underground portion of the plant, but nevertheless could find no individuals still persisting in the soil. Aphids would readily kill young cotton plants, especially if numerous, when not kept down by spraying with an appropriate wash, and the more so should hot soil conditions prevail.

It was very unsatisfactory to have so few data to go upon in arriving at the primary cause of the trouble in these instances mentioned. That this was the case was partly owing to the late hour in which the fact of the destruction of the seedling cotton in the instances mentioned had been brought to the Department's notice. There were some grounds for concluding, apart from what might be inferred from the data adduced, that much of the young cotton in these instances of failure had succumbed to meteorological factors acting through the medium of the soil.

The Study of Agriculture.

"Queensland needed the study of the science of agriculture more than any other activity," said the Premier (Hon. E. G. Theodore) in the course of a recent address to the students of Nudgee College. Continuing his remarks, the Premier asserted that Queensland must inevitably become a great agricultural State; it had all the resources to make it a wonderful country. The educational system should, therefore, impress upon the minds of Queensland youth the immensity of the wealth lying latent in her fertile soil. "If I can do anything," added the Premier, "as head of the Government, in interesting my colleague, the Minister for Education, in the development of the idea of such an aim in education, I shall do it with all my heart."

Overcrowded Professions and an Undermanned Industry.

"There had been too much inclination on the part of parents in the past," continued the Premier, "to draft their boys into the polite professions, such as medicine and law. The parents of to-day ought to realise that, as compared with other professions, there was just as much work called for, just as much intelligence required, just as great a force of character needed, just as many of those manly attributes which made for purpose in life, moulded in the study of the science of agriculture and the development of the resources of the soil. Queensland was destined, in the not very distant future, to carry a large population, which would

be earning a livelihood from tilling the soil. It would be only a little time when the farmer would occupy an immeasurably higher position. A man who was a farmer in England did not rate himself socially any lower than a man who was, say, a clerk in the Government service. Neither should it be in Queensland. In the future, there would be no undermining of the dignity of the man who made his livelihood from the land. Quite as much was required to train a man for the tilling of the soil as for any other occupation in life. Knowledge in the first degree was required of the chemistry of the soil and entomology. Knowledge was also required of such scientific things which would make the soil produce the best and add to the prosperity of the State. Our educational system must be so moulded that our farmers would be scientific farmers, and not merely potters upon the land."

A Field of Opportunity.

"The Government had recently had experience of the want of scientific men," the Premier added. "An expert was required to teach settlers how to grow cotton, and it had to go to America for a man at an expensive salary. A director of agriculture had had to be engaged from India, and an appeal had had to be made down South for a man to train our own men in certain directions. That should not be. The native Queenslander had as much ability and capacity to learn, and was quite as intellectual as the youth of any other country. The boys of to-day, and particularly those in colleges, had wonderfully improved opportunities for learning, as compared with fathers or their ancestors of some years ago. The system of education had made wonderful strides during the last twenty years, and even during the last ten years. Many boys now had the advantage of the secondary course, which they would not have had the remotest chance of getting twenty years ago. The boys should appreciate that, and, when the time came for them to choose a career, they should remember that this State was developing, and would become great. They should endeavour to visualise the future of what Queensland would be, and should not take a course of study which might lead them to professions already overcrowded. Any boy who had ambition and desired achievement, would have great possibilities in the vast extent of Queensland's resources. The policy of every Government would include advancement in education and science. The fact that there were hundreds of thousands of square miles in this State ought to instil in youth a great inspiration to go ahead and make the country a rich nation."

Ratoon Cotton.

Mr. B. Crompton Wood, chairman of the British Cotton Delegation, made the following statement on leaving South Australia:—

"A good deal has been written lately in the Press about growing cotton on the ratoon principle—that is, leaving the plant in the ground from year to year, instead of sowing annually. In face of the importance to the industry of this question, I should like to state some of the reasons that have lead us to condemn this system.

"All authorities who have ever had anything to do with manufacturing cotton agree that the fibre of cotton grown under ratoon methods deteriorates year by year, both in the strength and the regularity of the staple, the former resulting in weak yarn, the latter in greater waste in the process of spinning. Hence, ratoon cotton is not admitted in the Cotton Exchanges of the world as good, sound cotton. In addition to this, there can be no question that the system of ratooning increases the insect pests, which are so destructive to cotton, by affording a natural harbourage for them from year to year.

"So serious is this considered in Egypt that legislation has been passed enforcing the destruction of all cotton shrubs by fire at the end of each season. A similar law is not necessary in the United States where most cotton-growing areas are subject to heavy frosts, which, by killing the plant, prevent any question of ratooning, but in the few areas where frost does not occur, ratoon cotton is not grown, and the Department of Agriculture strongly condemn this method of culture.

"It must, therefore, be obvious that cotton grown under the ratoon system does not conduce to the production of the highest qualities of cotton, and so tends to imperil the success of the industry.

"In addition, as cotton growers in Australia are very favoured by the high price guaranteed to them by their Governments, the least they can do is to grow as good cotton as possible, so as to reduce the loss which almost certainly must be incurred by the community at large under these guarantees.

"Finally, to solve this question, tests are being made by the Australian Cotton Growing Association, who, subject to Government approval, are growing cotton from the same seed and in the same place, under both systems, so as to obtain exact data. I sincerely hope that until these experiments have proved otherwise, the practice, general in the world, of growing cotton annually shall be adopted in Australia.

"It must never be forgotten that in countries with cheap labour and low freights to the cotton spinning centres, it may pay to grow a third-rate quality of cotton, but this cannot apply to Australia."

Production, Prospects, and Prices.

The information set out hereunder has been abstracted from departmental summaries of market movements and weather conditions for the month of November. The value of a monthly journal as a vehicle for market information is obviously limited, and this review is merely a record of the month's conditions and marketings.

Weather and Crops.

The first week of November was hot and dry. In some of the maize areas, particularly the Lockyer, early sown crops were wilting. In the course of the week ended 11th November light showers were registered, fairly generally in the south-east corner. Light scattered showers were reported from other parts of the coast. Beneficial falls were reported from various Downs centres, though generally dry weather was favouring harvesting operations. Above the Range maize planting was being deferred for a further splash of the needful.

In the course of the second week of the term light showers were experienced in areas adjacent to the metropolis. Cotton planting was, however, being delayed for heavier precipitation. Country reports showed that an exceptionally dry spring had been experienced; as a result markets were improving in tone.

Widely distributed rains were reported in the third week of the term. These were, however, of a light nature, and their chief benefits were as pasture refreshers. Theebine had the highest registration with 183 points. Gympie was favoured to the extent of 145 points. Other places with over an inch registration were Nanango, Gundiah, Emu Vale, Stanthorpe, and Laidley. Good soaking rain was required to start the main new season's cotton planting and bring along the young plants already above ground.

Further useful showers were reported in the following week from the South Coastal, Carpentaria, and Central districts; thunderstorms were reported from some parts of the West. A good general fall was still an outstanding need. Temperatures were high.

The Markets.

Product.	Week ended 4th November.	Week ended 11th November.	Week ended 18th November.	Week ended 25th November.
Lucerne chaff..	6s. 9d. to 12s. 10d.	Prime to 11s. 6d.; Other grades, to 9s.	Prime, 8s. 4d. to 11s. 4d.	Prime to 10s.; Inferior, 5s. 3d. to 7s.
Oaten chaff ..	Border, 7s. 6d. to 9s. 9d.; Local, 4s. 6d. to 8s. 3d.	8s. to 10s. 3d. ..	Border, 8s. to 10s.; Local to 8s. 3d.	Border to 11s.; Local to 10s.
Mixed chaff ..	7s. 4d. to 9s. 7d.	7s. to 10s. 4d. ..	4s. 3d. to 10s. ..	9s.
Maize	5s. 2½d. to 5s. 4½d.	5s. 2½d. to 5s. 3½d.	5s. 5d. to 6s. 1½d.	6s. 2d.
Potatoes ..	11s. to 18s. 2d.	7s. 6d. to 10s. ..	10s. to 20s. 6d.	11s. to 18s. 6d.
Sweet potatoes	6s. to 7s. 6d. ..	7s. to 8s. ..	7s. 9d.	Market bare
Pumpkins ..	4s. 6d. to 8s. 3d.	11s. 6d.	6s. 6d. to 14s. ..	13s. 6d.
Wheat (feed) ..	5s. 7½d. to 6s. 5d.	6s. 4½d. to 6s. 6d.	5s. 6d. to 6s. 4d.	6s. 3d.
Barley	None offering ..	Baro	5s. (skinless) ..	4s. 4d. to 4s. 5d.
Broom millet ..	£40 to £50 ..	Unchanged ..	Unchanged ..	Unchanged

General Notes.

An Effective Rat Poison.

In an article in the current number of the "Quarterly Review" on "Education for Farmers," the statement is made that the rat population on the farms in England eat more food than would pay for all the agricultural education of the country, and on a scale undreamt of at present. The writer points out that a mixture of carbonate of barium and red squills, placed in a suitable medium, is death to rats, but will not harm a chicken. Poultry-keepers should make a note of the mixture and use it to exterminate the rats. Most chemists sell the mixture ready for use.

Red squills are only successful when obtainable in a fresh state, which is said to be not possible in Australia. Carbonate of barium is an effective poison used as follows:—Carbonate of barium, 8 oz.; oatmeal, 16 oz.; beef dripping or tallow, 8 oz.; salt, $\frac{1}{2}$ oz. Knead this mixture into a dough, cut into $\frac{1}{2}$ -inch cubes, and place near rat holes. This mixture is not considered dangerous to domestic animals or human life.

Arrowroot Pool Board.

The ballot taken by arrowroot growers for the purpose of selecting a board to control the Arrowroot Pool formed recently resulted as follows:—Messrs. Alex. Clark, Thos. Doherty, Alex. McG. Henderson, Johannes Lahrs, and J. F. W. Sultmann.

Wheat Pool Board.

The Wheat Board election results are as follows:—Messrs. F. J. Morgan, Robt. Swan, J. T. Chamberlin, B. C. C. Kirkegaard, A. J. Harvey, and Thos. Muir.

Meat Industry Advisory Board.

The gentlemen listed as follows have been elected to the Meat Industry Advisory Board:—Messrs. E. T. Bell, M.L.A., J. L. Wilson, R. C. Philp, T. Snelling, R. H. Edkins, W. P. Shaw, A. S. Drewe, W. H. Austin, R. Grant, and C. H. Sagar.

Development of Cotton Growing—Appointment of Director of Cotton Culture

A recent cablegram announced that Colonel G. Evans, lately Director of Agriculture in Bengal, has been selected by the Empire Cotton Growing Corporation, at the instance of the Queensland Government, to advise on the development of cotton growing in this State. In the course of a Press interview, the Premier (Hon. E. G. Theodore) said that Colonel Evans had been selected for the Queensland Government, and would occupy the position of director of cotton culture. He would be accompanied by a staff of assistants, also selected by the Corporation or by Colonel Evans. The Director of Cotton Culture and his staff would be appointed to their respective positions by the Queensland Government, but for the first two years their salaries would be paid by the Empire Cotton Growing Corporation, which, it would be remembered, had received a subsidy of £1,000,000 from the British Government for the purpose of encouraging the production of cotton within the Empire. At the expiration of the term of two years, the Queensland Government would make direct arrangements with Colonel Evans.

Answers to Correspondents.

Trees Suitable for Planting in the Bell District.

C. F. (Bell)—

The Government Botanist (Mr. C. T. White, F.L.S.) advises:—

Tamarind trees are not likely to do well, or, in fact, even to grow at Bell; this tree wants a rather moist tropical or sub-tropical climate.

Coral Trees of certain species (e.g., *Erythrina caffra*) might be worthy of trial. The flowering Gums (*Eucalyptus ficifolia* and *Eucalyptus calophylla*) do not as a general rule thrive well in Queensland, and it is better to only plant a few trees as a trial than a large number, though they are likely to succeed better at Bell than on the coast.

The trees listed as follows are likely to succeed, and should be all obtainable from Brisbane or Toowoomba nurserymen:—

- Pittosporum undulatum* (*Pittosporum*).
- Sterculia diversifolia* (Kurrajong).
- Sterculia rupestris* (Bottle tree).
- Sterculia trichosiphon* (Broad-leaved bottle tree).
- Schinus molle* (Pepper or pepperina tree).
- Schinus terebinthifolius* (Broad-leaved pepper tree).
- Acacia podalyriæfolia* (Queensland silver wattle).
- Bauhinia Hookeri* (Native Bauhinia tree).
- Albizia lebbek* (*Albizia* or "acacia tree").
- Melia composita* (White cedar).
- Eucalyptus* spp. (Gum trees).
- Celtis australis* (Portugese elm).
- Grevillea robusta* (Silky oak).
- Platanus occidentalis* (Plane tree).
- Pinus* spp. (Pines).

The Use of Lime in the Stanthorpe District.

M. E. S. (Appelthorpe), writes:—

Enclosed please find two Press cuttings* which have recently appeared in our local paper. At present the Fruitgrowers' District Council are taking steps with a view to obtaining large quantities of lime at cheaper rates, but after reading these articles, many growers are beginning to doubt the wisdom of such steps.

Will you kindly advise us on this matter. If you still advocate lime, kindly state—

- (1) Whether burnt or pulverised?
- (2) What quantities to be used, annually or otherwise?
- (3) Most suitable time to apply same?
- (4) Would it benefit where no green crop is grown?

Green crops suitable to grow here in winter are barley and peas (grey or dun), and melilotus clover.

Thanking you in anticipation.

* (1) Report of lecture upon the "Use of Lime on Soil," by Mr. H. Wenholz, N.S.W. Dept. of Agric., before the Agricultural Section of the Royal Society, Sydney.

(2) Letter by Mr. James Henderson, Stanthorpe, to "The Border Post."

On the letter and the Press cuttings the Agricultural Chemist (Mr. J. C. Brünnich) comments as follows:—

“The remarks made by Mr. Henderson contain a good deal of truth, and of course any application of some 6 tons of lime would be madness. With regard to the lecture delivered by Mr. Wenholz, of which an extract appeared in the ‘Border Post,’ it must be pointed out that the lecture does not apply to our fruitgrowing areas, but rather to general agriculture. The remarks made by Dr. Hall on the necessity of liming are perfectly correct, but apply to the intense cultivation practised in Europe.

“In order to study the lime requirements of our Stantlorpe granitic soils, the whole composition of the soil must be taken into consideration, and we find that although the actual amounts of plant foods are low, as compared with those found in our rich agricultural lands, they are well balanced and supported by an excellent physical condition of the soil, which encourages an exceptionally fine root development, and makes therefore the small amounts go much further.

“The average of 11 types of soil analysed was found to contain per acre to 12 inches depth—

Lime:	..	Total 4,270 lb.	Readily available 1,437 lb.
Phosphoric Acid:	Total 2,546 lb.	Readily available	197 lb.
Potash:	..	Total 2,423 lb.	Readily available 287 lb.
Nitrogen:	..	Total 1,355 lb.	—

adding lime to soils of this composition would be of little or no benefit to fruit trees, but quickly growing crops, like green manure crops, vegetables, &c., would undoubtedly be benefited, more particularly if other fertilisers, particularly those containing nitrogen and phoric acid, would be applied at the same time.

“Farmers often make the mistake in thinking and expecting that an application of lime alone will cure all evils and will replace the use of other fertilisers or even of thorough cultivation.

“The theoretical opinion so frequently expressed to use quick lime for heavy clayey soils, and to use pulverised limestone for light sandy soils, is quite correct, but should not be taken literally when applied to the light dressings of lime now made every 2 or 3 years, on account of the high cost of lime.

“When half a ton of quick lime is applied broadcast to an acre of ground after being air slaked, in a very short time the bulk of it will have changed into carbonate of lime, but still the action on the soil would be very quick by the slight amount of lime immediately dissolved by rain and dew, whereas when applying the equivalent amount of lime in form of one ton of pulverised limestone the action would be very slow, and perhaps not noticeable the first season.

“Therefore use lime in its cheapest form, which is burnt lime, apply at the rate of half a ton per acre, every 2 or 3 years, before the planting of green manures, and do not neglect the use of artificial fertilisers, and farmyard manure, and compost if available.”

“Fish Polson Vine” (*Derris Uliginosa*).

J. C. (Mibu Estate, Daru, Papua) writes:—

By this post I am sending you, under separate cover, the leaves, stem, and root of a vine, the roots are used by the natives here to stupefy fish with, and as we planters buy a lot of this fish to eat, we should be much obliged if you could tell us the poison it contains, and if it could be purchased and used for the same purpose.

The root in the package is the part that has a piece of the vine twisted round it, the natives only use the root, and beat it up to a pulp, and then squeeze it into still pools, presently the fish come up belly up, and are easily caught. The native name for the vine is “Sardie.” I can’t procure a flower or berry. They are propagated by slips. Thanking you in advance.

The Government Botanist (Mr. C. T. White, F.L.S.) comments as follows:—

“It bears no flowers or pods, but is evidently *Perris uliginosa*, a plant used considerably in New Guinea, Asia, North Australia, and the Pacific Islands as a fish poison. In New Guinea it goes under the name of “Dynamite Plant” from this fact.

"The poisonous principle is a resin isolated by the late Dr. Greshoff, a famous plant chemist, at one time Director of the Botanic Gardens, Buitenzorg, Java. The isolated resin cannot, I believe, be purchased, but the root of an allied species, *Derris elliptica*, is an article of export from Singapore, where it is known as Tuba roots.

"Derris roots and stems are a commercial product, and during the last few years have been largely used as the basis for many commercial insecticides. I have before mentioned the fact that the collecting of 'Sardie' stems and roots should be made a rather profitable native industry. What do you think of the probabilities of this?"

Dividing Fences.

R. P. H. (Yangan)—

(1) If you are in doubt about the line, you should employ a surveyor to determine the actual boundary, and if you decide to do so, you should give due notice to your neighbour of same.

(2) and (3) A dividing fence is sufficient if it keeps cattle back.

(4) If your neighbour's cattle trespass on your land, they can be impounded if the land is fenced, and there is no need to wait three months. If it is unfenced, you had better consult your solicitor before taking any action.

(5) Being unaware of local circumstances, you are advised to consult your solicitor.

The Cultivation of Newly Cleared Land.

S. Bale (Petrie)—

The Director of Agriculture, Mr. H. C. Quodling, replies to your queries as follows:—

"Land which has been previously covered with dense undergrowth requires different treatment to that where the timber has been ringbarked as in your case. Owing to the fact of the ringbarking, the soil is to a certain extent sweetened, and following on the removal of the timber is available for almost immediate cultivation. Virgin land, however, is always improved by being turned with the plough and exposed to atmospheric influences to sweeten it. No crops should be planted within the area covered by the limbs of any green tree, and if possible this radius should be increased to at least 50 per cent.

"Among crops which do well on new land may be mentioned potatoes, oats, and rape, but even with these a certain amount of variation is necessary.

"Liquid manure is usually utilised for the purpose of stimulating plants which require rapid growth, but should not be used too strong. For your purpose it is considered that half a three-bushel bag of well-rotted farm manure should be steeped in a cask of not less than 20 gallons of water. This should be used in the proportion of one gallon to six, and should never be applied to plants, under dry conditions, but should follow the application of pure water. Certain timbers contain a higher percentage of potash than others, but as a general rule wood ashes are all more or less of value as a fertiliser, as will be noticed where old stumps have been burnt out.

"You mention that your country is covered with lantana, red oak, silver wattle, &c. Where lantana is growing the land is improved somewhat by the root system of the lantana, also by the amount of leafy matter (humus) it returns to the soil.

"Farm yard manure is improved somewhat by mixture with wood ashes. The mixture should be applied immediately to the land. Owing, however, to the inclusion of slight quantities of carbonate of lime in ashes, these, when used on exposed farm yard manure, are likely to liberate a small portion of the ammonia contained therein.

"This Department issues a publication entitled 'Market Gardening,' which will be forwarded to you on receipt of 1s. This publication contains an amount of information which will be valuable to a new settler."

Disease among Fowls.

F. S. (Curra L.P.A.) writes:—

(1) Can you tell me the cause of fowls—laying hens—dropping dead from their roosts during the night. The fowls are weighty and healthy, and well fed on wheat and peas. We can find no trace of any animal causing the damage, neither, when we open the fowls, can we see the cause of death?

(2) About ten years ago the Agricultural Chemist compiled a table of "The Manurial Requirements of Plants per Acre," which was published in the "Journal." I had it pasted on cardboard, but I now find the vermin have eaten it away. Can you publish the same table again? It is exceedingly useful to fruitgrowers.

The Poultry Instructor (Mr. J. Beard) comments:—

(1) It is very difficult for me to diagnose the trouble the fowls are suffering from owing to the limited explanation given. The correspondent omits to explain the nature, substance, and colour of the excreta, which is my best guide. If the excreta is of a bilious nature, the fowls are suffering from enteritis.

Quarantine affected birds, clean thoroughly and disinfect the house and run. Give each affected bird two teaspoonfuls of castor oil. Two hours after give 10 drops of chlorodyne in bread in the form of a pill; should the excreta not harden in from six to eight hours, give another five drops. Give scalded milk to drink.

(2) Yes.

To Correspondents.

Correspondents seeking information through the Journal should address all communications to the Under Secretary, Department of Agriculture and Stock, Brisbane. Letters on official matters should not be addressed personally to the Editor, who may be away from Headquarters on official duty at the time of their delivery; so to ensure prompt acknowledgment all technical inquiries should be directed, as suggested, to the Under Secretary.

Farm and Garden Notes for January.

FIELD.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month,⁶ and it may be looked upon merely as an experiment. Plant potatoes whole. Early-sown cotton will be in bloom.

As the wet season is expected to commence this month, provision should be made accordingly.

On coastal and intercoastal scrub districts, where recently burnt-off scrub lands are ready for the reception of seed of summer-growing grasses, sowing may commence as soon as suitable weather is experienced. Much disappointment may be saved, and subsequent expenditure obviated, by ensuring that only good germinable grass seed is sown, of kinds and in quantities to suit local conditions, the circumstance being kept in mind that a good stand of grass is the principal factor in keeping down weeds and undergrowth.

In all districts where wheat, barley, oats, canary seed, and similar crops have recently been harvested, the practice of breaking up the surface soil on the cropped areas should invariably be adopted. Soil put into fit condition in this way will "trap" moisture and admit of the rains percolating into the subsoil, where the moisture necessary for the production of a succeeding crop can be held, provided attention is given to the maintenance of a surface mulch, and to the removal, by regular cultivation, of volunteer growths of all kinds. If not already seen to, all harvesting machinery should be put under cover, overhauled, and the woodwork painted where required.

Where maize and all summer-growing "hoed" crops are not too far advanced for the purpose, they should be kept in a well-cultivated condition with the horse hoe. Young maize and sorghum crops will derive much benefit by harrowing them, in the same direction as the rows are running, using light lever harrows with the tynes set back at an angle to obviate dragging out of plants, but the work should not be done in the heat of the day.

Quick-maturing varieties of maize and sorghum may still be sown in the early part of the month in coastal areas where early frosts are not expected.

Succession sowings may be made of a number of quick-growing summer fodder crops—Sudan grass, Japanese and French millet, white panicum, and liberty millet (panicum). In favourable situations, both "grain" and "saccharine" sorghums may still be sown; also maize, for fodder purposes.

Fodder conservation should be the aim of everyone who derives a living from stock, particularly the dairyman; the present is an important period to plan cropping arrangements. Exclusive of the main crops for feeding-off (when fodder is suitable for this purpose), ample provision should be made for ensilage crops to be conserved in silo or stack. As natural and summer-growing artificial grasses may be expected to lose some of their succulence in autumn, and more of it in winter and early spring, the cropping "lay-out" to provide a continuity of succulent green fodder throughout the season calls for thorough and deep cultivation and the building up of the fertility and moisture-holding capacity of the soil. Planter's friend (sorghum) may be sown as a broadcast crop at the latter end of the month for cutting and feeding to cattle in the autumn and early winter. Strips of land should be prepared also for a succession sowing about the second week in February, and for winter-growing fodder crops.

KITCHEN GARDEN.—A first sowing of cabbages, cauliflower, and Brussels sprouts may now be made in a covered seed bed, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering.

Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflower, mustard, cabbage, celery, radish for autumn and winter use. Sow celery in shallow well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter are, however, unlikely to succeed except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; also garlic, onions, and eschalots as the tops die down.

FLOWER GARDEN.—To make the flower-beds gay and attractive during the autumn and winter months is not a matter of great difficulty. Prepare a few shallow boxes, boxes with the compost; then sow thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle lift them gently one by one with a knife or a zinc label—*never pull them up by hand*, as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty of leaf mould. Keep a sharp lookout for slugs and caterpillars.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to over-water at this season. Propagate verbenas, not forgetting to include the large scarlet Fox-hunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed-boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work, the flower garden in autumn and winter will present a charming sight.

Orchard Notes for January.

THE COASTAL DISTRICTS.

All orchards, plantations, and vineyards should be kept well cultivated and free from weed growth; in the first place, to conserve the moisture in the soil, so necessary for the proper development of all fruit trees and vines; and, secondly, to have any weed growth well in hand before the wet season commences. This advice is especially applicable to citrus orchards, which frequently suffer from lack of moisture at this period of the year if the weather is at all dry, and the young crop of fruit on the trees is injured to a greater or less extent in consequence.

Pineapple plantations must also be kept well worked and free from weeds, as when the harvesting of the main summer crop takes place later on, there is little time to devote to cultivation. If this important work has been neglected, not only does the actual crop of fruit on the plants suffer, but the plants themselves receive a setback.

Banana plantations should be kept well worked, and where the soil is likely to wash badly, or there is a deficiency of humus, a green crop for manuring may be planted. Should the normal wet season set in, it will then soon cover the ground without injury to the banana plants. When necessary, banana plantations should be

manured now, using a complete manure rich in potash and nitrogen. Pineapples may also be manured, using a composition rich in potash and nitrogen, but containing no acid phosphate (superphosphate) and only a small percentage of bone meal, ground phosphatic rock, or other material containing phosphoric acid in a slowly available form.

Bananas and pineapples may still be planted, though it is somewhat late for the former in the more Southern parts of the State. Keep a good lookout for pests of all kinds, such as Maori on citrus trees, scale insects of all kinds, all leaf-eating insects, borers, and fungus pests generally, using the remedies recommended in Departmental publications.

Fruit-fly should receive special attention, and on no account should infested fruit of any kind be allowed to lie about on the ground to become the means of breeding this serious pest. If this is neglected, when the main mango crop in the South and the early ripening citrus fruits are ready, there will be an army of flies waiting to destroy them.

Be very careful in the handling and marketing of all kinds of fruit, as it soon spoils in hot weather, even when given the most careful treatment. Further, as during January there is generally more or less of a glut of fresh fruit, only the best will meet with a ready sale at a satisfactory price.

Grapes are in full season, both in the Brisbane and Coominya districts, and in order that they may be sold to advantage they must be very carefully handled, graded, and packed, as their value depends very much on the condition in which they reach the market and open up for sale. Well-coloured fruit, with the bloom on and without a blemish, always sells well, whereas badly coloured, immature, or bruised fruit is hard to quit.

One of the greatest mistakes in marketing grapes is to send the fruit to market before it is properly ripe, and there is no better way to spoil its sale than to try and force it on the general public when it is sour and unfit to eat.

Bananas for sending to the Southern States require to be cut on the green side, but not when they are so immature as to be only partially filled. The fruit must be well filled but show no sign of ripening; it must be carefully graded and packed and forwarded to its destination with as little delay as possible.

Pineapples should be packed when they are fully developed and the base pips are beginning to show the first trace of colour. Immature fruit must not be sent. For canning, the fruit should be partly coloured; immature fruit is useless; and over-ripe fruit is just as bad. The former is deficient in colour and flavour and the latter is "winey" and of poor texture, so that it will not stand the necessary preparation and cooking.

Should there be a glut of bananas, growers are advised to try and convert any thoroughly ripe fruit into banana figs.

The fruit must be thoroughly ripe, so that it will peel easily, and it should be laid in a single layer on wooden trays and placed in the sun to dry. If the weather is settled, there is little trouble, but if there is any sign of rain the trays must be stacked till the weather is again fine, and the top of the stack protected from the rain. To facilitate drying, the fruit may be cut in half lengthways. It should be dried till a small portion rubbed between the finger and thumb shows no sign of moisture. It can be placed in a suitable box to sweat for a few days, after which it can be dipped in boiling water to destroy any moth or insect eggs that may have been laid on it during the process of drying and sweating. It is then placed in the sun to dry off any moisture, and when quite dry it should be at once packed into tight boxes lined with clean white paper. It must be firmly packed, when, if it has been properly dried, it will keep a considerable time. It can be used in many ways, and forms an excellent substitute for raisins, sultanas, currants, or other dried fruits used in making fruit cakes and other comestibles. Banana figs will be found useful for home consumption, and it is possible that a trade may be built up that will absorb a quantity of fruit that would otherwise go to waste.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

January is a busy month in the Granite Belt, and orchardists are fully occupied gathering, packing, and marketing the crop of midseason fruits, consisting of plums of several kinds, peaches, nectarines, pears, and apples. The majority of these fruits are better keepers and carriers than those that ripen earlier in the season; at the same time, the period of usefulness of any particular fruit is very limited, and it must be marketed and disposed of with as little delay as possible.

The advice given in the Notes for December, to send nothing but first-class fruit to market, still holds good. With the great increase in production, owing to the large area of new orchards coming into bearing and the increasing yields of those orchards that have not come into full profit, there is not likely to be any market for immature or inferior fruit. There will be ample good fruit to fully supply the markets that are available and accessible. Much of the fruit will not carry much beyond the metropolitan market, but firm-fleshed plums, clingstone peaches, and good, firm apples should stand the journey to the Central, and, if they are very carefully selected, handled in a manner to prevent any bruising, and properly graded and packed, they should carry as far as Townsville. Growers must remember that, given a market fully supplied with fruit, only such fruit as reaches that market in first-class condition, is likely to bring a price that will pay them; consequently the grower who takes the trouble to send nothing but perfect fruit, to grade it for size and colour, to pack it carefully and honestly, placing only one sized fruit, of even quality and even colour, in a case, and packing it so that it will carry without bruising, and, when opened up for sale, will show off to the best advantage, is pretty certain of making good. On the other hand, the careless grower who sends inferior, badly graded, or badly packed fruit is very likely to find, when the returns for the sale of his fruit are to hand, that after paying expenses there is little, if anything, left. The expense of marketing the fruit is practically the same in both cases.

Then "why spoil the ship for the ha'p'orth of tar" after you have gone to the expense of pruning, spraying, manuring, and cultivating your orchard? Why not try and get a maximum return for your labour by marketing your fruit properly? The packing of all kinds of fruit is a fairly simple matter, provided you will remember—

- (1) That the fruit must be fully developed, but yet quite firm when gathered.
- (2) That it must be handled like eggs, as a bruised fruit is a spoilt fruit, and, when packed with sound fruit, spoils them also.
- (3) That only one-sized fruit, of an even degree of ripeness and colour, must be packed in a case.
- (4) That the fruit must be so packed that it will not shift, for if it is loosely packed it will be so bruised when it reaches its destination that it will be of little value. At the same time, it must not be packed so tightly as to crush the fruit.

If these simple rules are borne in mind, growers will find that much of the blame they frequently attribute to the fruit merchants or middlemen is actually the result of their own lack of care. Fruit that opens up in the pink of condition sells itself, whereas any fruit that opens up indifferently is hard to sell on any except a bare market, and on a glutted market is either unsaleable or realises such a poor price that the grower is frequently out of pocket and would have been better off had he not attempted to market it.

If spraying with arsenate of lead, and systematic bandaging, has been properly carried out, there will be comparatively few codlin moths to destroy the later ripening pip fruits; but if these essential operations have been neglected or carelessly carried out, a number of moths will hatch out and the eggs laid by them will turn to larvæ that will do much damage, in some cases even more than that caused by the first broods that attack the fruit as soon as it is formed. Where there is any likelihood, therefore, of a late crop of moths, spraying with arsenate of lead must be continued if the late crop of pip fruits is to be kept free from this serious pest.

Fruit-fly must be systematically fought, and on no account must any fly-infected fruit be allowed to lie about on the ground and breed this pest, to do further damage to the later ripening fruits.

Citrus orchards will need to be kept well cultivated in the drier and warmer parts of the State, and, where necessary, the trees should be irrigated. If scale insects are present, the trees should be either sprayed, or, better still, treated with hydrocyanic acid gas.

Western grapes are in full season, and if they are to be sent long distances by rail, then they are all the better to be cut some hours before they are packed, as this tends to wilt the stems and keep the berries from falling off in transit. The fruit must be perfectly dry when packed, and should be as cool as possible. It must be firmly packed, as a slack-packed case always carries badly and the fruit opens up in a more or less bruised condition.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1922.	OCTOBER.		NOVEMBER.		DECEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5:34	5:50	5:4	6:8	4:50	6:32
2	5:33	5:51	5:3	6:9	4:50	6:33
3	5:32	5:52	5:3	6:9	4:50	6:34
4	5:31	5:52	5:2	6:10	4:50	6:35
5	5:29	5:53	5:1	6:11	4:50	6:36
6	5:28	5:53	5:0	6:12	4:51	6:36
7	5:27	5:54	5:0	6:12	4:51	6:37
8	5:25	5:54	4:59	6:13	4:51	6:38
9	5:24	5:55	4:59	6:14	4:51	6:38
10	5:23	5:55	4:58	6:15	4:51	6:39
11	5:22	5:56	4:57	6:16	4:52	6:39
12	5:21	5:56	4:57	6:16	4:52	6:40
13	5:20	5:57	4:56	6:17	4:52	6:40
14	5:19	5:57	4:56	6:18	4:52	6:41
15	5:18	5:58	4:55	6:19	4:53	6:41
16	5:17	5:59	4:55	6:20	4:53	6:42
17	5:16	5:59	4:54	6:20	4:53	6:43
18	5:15	6:0	4:54	6:21	4:54	6:44
19	5:14	6:0	4:53	6:22	4:54	6:45
20	5:13	6:1	4:53	6:23	4:55	6:45
21	5:12	6:2	4:53	6:24	4:55	6:46
22	5:11	6:2	4:52	6:24	4:56	6:46
23	5:10	6:3	4:52	6:25	4:56	6:46
24	5:9	6:3	4:51	6:26	4:57	6:47
25	5:8	6:4	4:51	6:27	4:57	6:47
26	5:8	6:5	4:51	6:28	4:58	6:47
27	5:7	6:6	4:50	6:28	4:59	6:48
28	5:6	6:6	4:50	6:29	5:0	6:48
29	5:5	6:7	4:50	6:30	5:0	6:49
30	5:5	6:7	4:50	6:31	5:1	6:49
31	5:4	6:8	...	...	5:1	6:49

PHASES OF THE MOON, OCCULTATIONS, &c

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer" Time is not used.

6 Oct. ○ Full Moon 10 58 a.m.
 14 " ☾ Last Quarter 7 55 a.m.
 20 " ☾ New Moon 11 40 p.m.
 27 " ☾ First Quarter 11 26 p.m.

Apogee on 5th at 6 a.m.

Perigee on 20th at 2.42 a.m.

An occultation of Delta Tauri will take place on 10th October about a quarter past 9. With binoculars or a small telescope this will be an interesting sight as the Moon will be in the group of stars called the Hyades of which Aldebaran is the principal star.

5 Nov. ○ Full Moon 4 36 a.m.
 12 " ☾ Last Quarter 5 52 p.m.
 19 " ☾ New Moon 10 6 a.m.
 26 " ☾ First Quarter 6 15 p.m.

Perigee on the 17th at 10.6 a.m.

Apogee on the 29th at 5.24 a.m.

Delta Tauri will again be occulted about 3 a.m. on the 7th; also Eta Virginis on the 15th about 9.30 p.m.; and the planet Saturn on the 16th about 5 p.m. when the Moon and it are far below the horizon.

4 Dec. ○ Full Moon 9 24 p.m.
 12 " ☾ Last Quarter 2 41 a.m.
 18 " ☾ New Moon 10 20 p.m.
 26 " ☾ First Quarter 3 53 p.m.

Perigee on 15th at 1.30 a.m.

Apogee on 27th at 2.6 a.m.

Delta Tauri will be occulted about 10 a.m. on the 4th, when the Moon and star are below the horizon, but on the 31st, when it will be occulted about the time of sunset, an interesting observation of the star's reappearance may be possible in the twilight.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

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GENERAL INDEX.

	Page.		Page.
A.			
Abortion, Contagious	191	Beef Nodules Experiments	247
Acid Syphoning	448	Beefwood, Scrub	304
Agricultural Chemistry	60	Beerburum Pineapple Subsidy	154
Agricultural Clubs for Juniors	462	Beetle Attacking Asters	158
Agricultural Colleges	459	Beetle Borer, Banana	68, 523
Agricultural Correspondence Course	462	Beetle, Destructive	155
Agricultural Council Standing Committee	342	Beetle of Apples	3
Agricultural Education	453	Beetle of Cane Collection	374
Agricultural Education and the Cinema	457	Beetle of Cane Enemies	157
Agricultural Education in Queensland and California	144	Beetle of Cane, Experiments with Aromas	207
Agricultural Education in Queensland and University Activities	445	Beetle of Cane Mortality	206
Agricultural Industry Organisation in Queensland	166, 258, 358, 458	Beetle of Cane Tachinid Parasites	207
Agriculture in Queensland in 1922	54	Beetle of Cotton	337
Agricultural Seeds, Germinating Capacity and Purity Analysis	180, 181	Beetles of Cane	87
American Cotton Conditions	344	Beetles on Feeding Trees	207
Animals and Birds Acts of 1921	433	Beetles, Rutellidoe	333
Analysis of Agricultural Seeds, Purity	181	Benson's Improving the Quality and Productiveness of Fruit and Fruit Trees	416
Ankylostoma Duodenale in Pigs	176	Benson's Orange Sucking Bugs	33
Answers to Correspondents 46, 153, 347, 447, 540		Berkshire Pigs	308
Ants and Sugar-cane (White)	372	Birds and Animals Act, 1921	433
Ants (White)	158	Bitter Rot of Apple	196
Aphis, Woolly	498	Black Apple-tree or Black Plum	78
Apple Beetle	3	Black Leg	176
Apple Bitter Rot	196	Black Mauritius Bean	540
Apple Board (Pine)	45	Black Pig (British)	518
Apple, Commercial Packing, Grading, and Picking of	387	Black Spot in Tomatoes	349
Apple, Export Experiments of	155	Board for Fodder Conservation	165
Apple-tree, Black	78	Board, Egg	385
Apples without Core	435	Board, Pineapple Referendum	45
Aromas, Experiments with, for Attracting Cane Beetles	207	Board, Tomato Pool	45
Arrowroot	331	Boll Weevil, Arsenic Preventive	342
Arsenic as Grass Killer	447	Boll Weevil, California Free from	444
Arsenic Preventive for Boll Weevil	342	Boll Weevil Menace and Calcium Arsenate Method of Destruction	493
Arsenic Supplies for Pear Poison (State)	248	Boll Worm	444
Asters, Beetles	158	Bond's Rainfall Table 35, 100, 250, 285, 386, 536	
Astronomical Data 50, 162, 254, 354, 454, 544		Borer Beetle of Banana	15, 68, 523
B.		Borer Moth	373
Bacon Industry on Downs	446	Borer Moth of Sugar-cane	18
Baits, Fly Poison	194	Borer, Timber	371
Banana Beetle Borer	15, 68, 523	Borer, Wood Weevil	195
Banana, Bunchy Top	32	Bot Fly	285
Banana, Historic	531	Boyd and Martin's Tobacco Culture	4
Banana Plants, Removal Prohibition	535	Bread Ropiness	348
Barley	57	Breeding Hens, Picking	444
Bean, Mauritius	540	Breeding Pigs Selection	519
Bears and Opossums Protection	342, 443	Breeds of Pigs for Queensland	308, 412, 518
		British Black Pig	518
		British Empire Exhibition	379
		Brown Phyparida Beetle	3
		Brown Rot	197
		Brown's Sheep Stomach Worms	83
		Brünnich and Coleman's Fertilisers, Manures, and Fertilisers Acts	214
		Bug, Orange Citrus	103
		Bug, Orange Sucking	33

	Page.
Bull, Dairy	357
Bunchy Top Banana Disease	32
Butter Cow, Australia's World Champion	246
Butter Grading	511
Butter Storage	509
Butter Tests, Illawarra	538

C.

Cabbage Moth	371
Calcium Arsenate Destruction of Boll Weevil	493
California Freed from Cotton Boll Weevil	444
Californian Methods of Poultry Raising and Marketing	10, 112
Canary Seed	57
Cane and White Ants	372
Cane Beetles	87
Cane Beetles Enemies	157
Cane Beetles, Experiments with Aromas	207
Cane Beetles Mortality	206
Cane Beetles Tachinid Parasite	207
Cane Culture and Fertilisers	121
Cane Grubs	373
Cane Grubs Parasites	473
Cane Moth Borer	18, 373
Cane Pest Combat and Control	16, 86, 206, 282, 472
Caterpillars	3
Caterpillars of Tomatoes	498
Caterpillar Plague and Cattle	190
Cattle Immunity <i>re</i> Tick Fever	172
Cattle, Impaction Paralysis of	366
Cattle, Lantana Poisoning in	176
Cattle Mastitis	175
Cattle Tetanus	175
Cattle, Treatment for Eating Wild Passion Vine	326
Cheese and Cheese Tests	63, 507, 509
Chemistry, Agricultural	60
Chicken Worms	46
Cinema and Agricultural Education	457
Citriculturist's Appointment	522
Citrus Orange Bug	103
<i>Cleome Aculeata</i> Weed	516
Climate and Sunspots Relation	377
Codling Moth	497
Cold Storage Checks Fruit Fly	435
Coleman and Brünich's Fertilisers, Manures and Fertilisers Acts	214
Coleman's Review of Pure Seeds and Stock Foods Acts	178
Colleges, Agricultural	459
Commercial Picking, Grading, and Packing of Apples, Pears, Peaches, Tomatoes, and Plums	387
Conference, Sugar	124
Conservation of Fodder, Board	165
Contagious Abortion	191
Contagious Pleuro-pneumonia	190
Co-operation	52, 358, 497
Co-operation and Economic Education	163
Co-operative Marketing	355
Coreless Apple Discovery	435
Correspondence Course in Agriculture	462
Cotton	54, 331
Cotton Acreage Map, 1922-23, January No.	344
Cotton, American Conditions	337
Cotton Beetles	337
Cotton Boll Weevil Destruction by Calcium Arsenate	493
Cotton Boll Weevil: How California Keeps Free	444

Cotton Culture	146, 350, 366
Cotton, Empire Growing	101
Cotton Goods, Australian Market	342
Cotton Grading	257
Cotton-growers of Queensland	344
Cotton Guarantee	256, 365
Cotton Industry Control	457
Cotton Industry in Queensland	18, 233
Cotton Industry, Special Legislation	153
Cotton Pests	156, 250, 257, 409, 493
Cotton Pests and Diseases Regulation in British Colonies and India	335
Cotton Pests, Smoking Out	312
Cotton Picking	315
Cotton Ratoons	153, 356
Cotton Seed	446
Cotton, World Production and Consumption	494-495
Cotton Worm	220
Council of Agriculture	347
Cow, Australian Champion Butter	246
Cream Wagons Refrigeration	504
Credit in South Africa, Rural	43
Cutworms	3

D.

Dairy and Pig Fodder Plots	58
Dairy Bull	357
Dairy Herd, Q.A.C.	81, 211, 326, 385, 501
Dairy Industry and Conference	61, 502
Dairy, Neutralisation and Pasteurisation	61
Darling Downs Egg-laying Competition	421
Delegation <i>re</i> Sugar Industry	268
Dentition of Sheep	320
Departmental Appointments	245, 344, 386, 443, 537
Diseases and Pests of Cotton Regulations in British Colonies and India	235
Diseases in Plants Acts and Regulations	246, 516
Diseases of Bananas	32
Diseases of Tomatoes	498
Dipping Fluids	178, 190
Dips and Dips Mixture	189, 349
Dogs Paralysed by Scrub-tick Bite	177
Drought Fighting and Problem	164, 538
Dumps Favoured, Central	164

E.

Easterby's Queensland Sugar Industry	200
Easterby's Use of Fertilisers in Sugarcane Culture	121
Economic Education and Commonsense Co-operation	163
Education, Agricultural	458
Education and the Cinema, Agricultural	457
Education in Agriculture—Queensland University Activities	445
Education in Queensland and California, Agricultural	144
Education, Technical	456
Education Work and Fruit Industry	530
Egg Board	385
Egg-laying Competitions	36, 149, 240, 321, 419, 421, 532
Egg, Outsize	311
Egg Packing	348
Egg Pool Ballot	456, 539
Eglinton's Astronomical Data	50, 162, 254, 354, 454, 544

	Page.		Page.
Electric Light Harvesting	43	G.	
Empire Cotton Growing	101	Garden and Farm Notes 253, 351, 451,	543
Empire Exhibition, British	379	General Notes 45, 152, 245, 341, 443,	537
English Potatoes	57	Germinating Capacity and Purity of	
Event and Comment 42, 163, 255, 355,	455	Principal Seeds Imported in Queens-	
Exhibition, British Empire	379	land	183
Experiment Station, Townsville	173	Germinating Capacity of Agricultural	
		Seeds	180
F.		Ghittoe Tree, Southern	197
Farm Advisers	462	Gidyea Poisoning of Stock	191
Farm and Garden Notes 253, 351, 451,	543	Gilbert River Horse Disease	175
Farm Bureaux	255	Grading Apples	387
Farm Notes	48, 159	Grading Butter	511
Farm Schools	459	Grading Cotton	257
Farmers' Furred and Feathered Friends	433	Grading Lemons	266
Fattening Pigs	448	Grading Organisation	258
Feathered Friends of Farmer	349, 433	Grading Pears, Peaches, Plums, and	
Fence for Pigs, Effective	148	Tomatoes	387
Fertilisers Acts and Amendments	38	Grapes Fruit Fly	195
Fertilisers Acts, Manures, and Fertil-		Grass Killed by Arsenic	447
isers	214	Grass, Sudan	46
Fertilisers, Nitrogenous	538	Grubs Breeding, Scaraboeid	206
Fertilisers, Testing	153	Grub Parasites, Cane	473
Fertilisers, Use in Sugar-cane Culture	121	Guarantee, Cotton	256, 365
Fever and Cattle Immunity, Tick	172		
Fever, Swine	192	H.	
Field Reports, Sugar 7, 118, 208, 279,	469	Halfordia Drupifera Tree	198
Finance Question	164	Handling Carelessness: Cause of Pine-	
Financing Farmers in New Zealand	44	apple Trade Damage	440
Fistula Treatment	278	Harvesting by Electric Light	43
Flashlights, Prohibition in Opossum		Herd Testing	64
Trapping	456	Hide Tanning	447
Fluids for Dipping	178, 190	Horses Export	185
Fly, Bot	285	Horses, Gilbert River Disease	175
Fly Checked by Cold Storage, Fruit	435	Horse Mange Treatment	337
Fly, Eggs, Fruit	370	Horses, Small Worms Treatment	337
Fly, Fruit	1, 194, 284, 369, 496		
Fly, Grape	195	I.	
Fly Parasites	195	Impaction Paralysis of Cattle	366
Fly Parasites, Tachinid	207	Inoculation Period	536
Fly Poison Baits	194		
Fly, Tomato	196	J.	
Fodder Conservation	67	Jarvis' Fruit Fly Investigations 1, 369	
Fodder Conservation Board	165	Jensen's Sunspots and Relation to	
Fodder for Pig and Dairy	58	Climate	377
Food for Stock and Poultry, Pumpkin		Jensen Theory and Sunspot Minimum	42
and Melon Seeds	449		
Food Silage	304	K.	
Fowl Killing	130	Kola Nut	540
Francis and White's Queensland Trees			
and Weeds 78, 81, 197, 238, 286, 409,	513	L.	
Friesian Record	538	Land for Settlement	539
Froggatt's Banana Beetle Borer 15, 68,	523	Lantana Cattle Poisoning	176
Fruit	331	Layer and Breeder Picking	444
Fruit and Fruit Trees Quality and		Lemons, Grading	266
Productiveness Improvement	416	Local Producers' Associations	256
Fruit Expert	152	Lucerne	57
Fruit Fly Checked by Cold Storage	435		
Fruit Fly Eggs	370	M.	
Fruit Fly Grape	195	Maiden's Blush Tree	513
Fruit Fly Investigations 1, 194, 369,	496	Main Roads Board	132
Fruit Fly Parasites	195	Maize	54, 331
Fruit Fly (Tryon's Common)	284	Mango Treatment, Horses	339
Fruit Industry Educational Work	530	Mangosteen (Meston)	43, 245
Fruit Industry Important New		Manures, Fertilisers, and Fertilisers	
Regulation	129	Acts	214
Fruit Industry Lantern Slide Lectures			
and Fruit Packing Classes	443		
Fuel Plant Resources, Motor	455		
Fungus Diseases	4, 196		
Fungus Disease of Tomato	498		
Furred Friends of Farmer	433		

	Page.		Page.
Marara Tree	409	Peaches, Commercial Picking, Grading, and Packing	387
Marketing Organisation	258	Pear Checking, Prickly	537
Martin and Boyd's Tobacco Culture	4	Pear, Commercial, Picking, Grading, and Packing	387
Mastitis in Cattle	175	Pear Commission, Prickly	256
Mauritius Bean	540	Pear Poison, Prickly	248
Melon Seeds as Food for Stock and Poultry	449	Pests and Diseases of Cotton Regulations, India and British Colonies	235
Meston Mangosteen	43	Pests of Cane Combat and Control	16
Mill Offal	347	Pests of Cotton in North Queensland	409
Minister's New Year Message to Farmers, Frontispiece, January Number		Pests of Cotton, Smoking Out	312
Mortgages Questions	165	Phosphates, Super	151
Moth Borer	373	Picking Apples, Peaches, Pears, Plums, and Tomatoes	387
Moth, Cabbage	371	Pig and Dairy Fodder	58
Moth, Codling	497	Pig Ankylostoma Duodenale	176
Moth, Tussock	196	Pig Breeds for Queensland Conditions	308, 412, 518
Motor Fuel Plant Resources	455	Pig Fattening	448
Mycotic Poisoning	190	Pig Fence, Effective	148
N.		Pig Pool	537
National Utility Poultry Breeders' Association Competition, Zillmere	111	Pigeon, Nutmeg	245
Native Bears and Opossums Protection	342, 443	Pineapples, Beerburum Subsidy	154
Natural Enemies of Sugar Cane Beetles	157	Pineapple Board Referendum	45
New Year Message to Farmers, Minister's, January Number, Frontispiece		Pineapple Crop Distribution Scheme	247
Night Harvesting by Electricity	43	Pineapple Trade, Cause of Damage	440
Nitrogenous Fertilisers	538	Pink Boll Worm	444
Nodules in Beef Experiments	247	Pink Marara Tree	409
Nut, Kola	540	Plants Diseases Regulations and Acts	246, 516
Nutmeg Pigeon	245	Plants Pathology	371
Nut, Thin-shelled Variety, Queensland	539	Plants, Removal Prohibited, Banana	535
O.		Plants, Resources for Motor Fuel	455
Offal, Mill	347	Pleuro-pneumonia Contagious	190
Ophthalmia in Poultry	449	Plum, Commercial Picking, Grading, and Handling	387
Opossums and Native Bears Protection	342, 443	Plum Tree, Black	78
Opossum Open Season	537	Pneumonia (Contagious Pleuro-)	190
Opossum Trapping	456	Poison Fly Baits	194
Orange Citrus Bug	103	Poisoning, Mycotic	190
Orange Grading	266	Poisoning of Cattle by Lantana	176
Orange Marketing	260	Poisoning of Stock by Gidyea	191
Orange Sucking Bug	33	Poisoning Prickly-pear	248
Orchard Boxes	389	Poland-China Pig Breed	412
Orchard Notes 47, 160, 251, 352, 452, 541		Pool Ballot, Egg	456
Organisation of Agricultural Industry in Queensland	166, 258, 358, 458	Pool Board, Tomato Pool Act	45
Organisation of Agriculture in Queensland, Interest in America and South Africa	346	Pool, Pig	537
P.		Pools Acts and Regulations	245
Packing Apples	387	Pools and Victorian Farmers	341
Packing Organisation	258	Potatoes and Potato Returns 57, 331, 449	
Packing Peaches, Pears, Plums, and Tomatoes	387	Poultry	331
Para-dichlorobenzene	18, 86, 206	Poultry Breeders' National Utility Association	111, 243, 323, 423
Paralysis in Dogs due to Scrub Tick Bito	177	Poultry Breeding	109
Paralysis of Cattle Impaction	366	Poultry Crates	325
Parasites of Cane Beetle	207	Poultry, Eye Worms	158
Parasites of Cane Grub	473	Poultry Feeding	347
Parasites of Fruit Fly	195	Poultry Food, Pumpkin and Melon Seeds as	449
Parasites of Tachinid Fly	16	Poultry Keeping Instruction	45
Passion Vine Eating by Cattle, Wild	326	Poultry Ophthalmia	449
Pasteurisation Value	257	Poultry Roup	158
Pathology of Plants	371	Poultry Raising and Marketing Methods in California	10
Peach Culture	13	Poultry Selection	109
Peach Leaf Poison Bush or Wild	81	Poultry Worms of the Eye	158
		Prickly-pear Checking	537
		Prickly-pear Commission	256
		Primary Producers' Pool Acts and Regulations	45
		Primary Producers' Association (Local)	256
		Pumpkin and Melon Seeds as Food for Stock and Poultry	449
		Pure Seeds Acts and Amendments	115
		Pure Seeds Acts and Stock Food Acts	178
		Purity Analysis of Agricultural Seeds	181
		Purity of Principal Seeds Imported in Queensland	183

	Page.		Page.
Q.			
Queensland Agriculture in 1922	54	Stacking Silage	249
Queensland Dairy Industry in 1922	61	Stacks and Silage	288
Queensland Nut, Thin-shelled	539	Staggers	347
Queensland Producers' Association	327	Stallion Examinations	186
Queensland Trees	78, 304	Standing Committee, Council of Agriculture	342
Quinine Plant Dip Mixtures	348	Stanthorpe Tomatoes	154
Quodding's Queensland Agriculture	54	State Farms Report for 1922	59
Quodding's Silage and Stacks	288	State Insurance	245
R.		Stock and Poultry Food, Pumpkin and Melon Seeds	449
Rainfall Chart Table 32, 35, 100, 250, 285,	386, 536	Stock Diseases	190
Ratoon Cotton	153, 357	Stock Experiment Station, Townsville	173
Ratoon Sugar Crops	372	Stock Food and Pure Seeds Acts	178
Redwater Immunisation	173	Review	191
Referendum, Pineapple Board	45	Stock, Gidyea Poisoning	187
Refrigerated Cream Wagon	504	Stock Infested by Tick, Travelling	187
Reid and Story's Organisation of Agricultural Industry in Queensland	166, 258, 358, 458	Stock Movements	187
Research Work	461-468	Stock of Queensland	185
Roads Board, Main	132	Stock Statistics	185
Ropiness in Bread	348	Stock Studies	308, 412, 518
Rose-leaf Tree	409	Stock Tuberculosis	192
Ross's Viticulture	131	Stomach Worms, Sheep	83
Rot of Apple, Bitter	196	Storage Checking Fruit Fly, Cold	435
Rot of Apple, Brown	197	Story and Reid's Organisation of Agricultural Industry in Queensland	166, 258, 358, 458
Rowland's Commercial Picking, Grading, and Packing of Apples, Pears, Peaches, Tomatoes, and Plums	387	Story's Agricultural Education in Queensland and California	144
Roup of the Eye in Poultry	158	Stud Stock Pig Breeds Studies	308, 412, 518
Rubber Vine Weed	286	Sucking Bugs of Orange	33
Rural Credit in South Africa	43	Sudan Grass	46
Rutellidæ Beetles	333	Sugar Assessment	444
S.		Sugar Beet Growing	449
Scarabæid Grub Breeding	206	Sugar Beetle Collecting	374
School Farms	459	Sugar-cane and White Ants	372
Science Notes	333	Sugar-cane Beetles' Enemies	157
Scientists of Australia, Defence	42	Sugar-cane Cultivation and Fertilisers	127
Scrub Beefwood	304	Sugar-cane Moth Borer	18
Scrub Tick Bite Paralysis in Dogs	177	Sugar Crop Prospects	208
Seeds and Stock Foods Acts Review	115, 178	Sugar Experiments	76, 425, 474
Seeds, Canary	57	Sugar Field Reports 7, 118, 208, 279,	371, 469
Seeds, Cotton	446	Sugar Industry	164, 200
Seeds, Germination Capacity and Purity Analysis	180-1	Sugar Industry Conference	124
Seeds of Frequent Occurrence (Weed)	182	Sugar Industry Future and Delegation	268, 499
Seeds of Pumpkin and Melon as Stock and Poultry Food	449	Sugar Industry Stabilisation Proposals	124
Septic Infection of Feet of Imported Sheep	176	Sugar Ratoon Crops	372
Settlement, Land	539	Sunspots and Climate Relation	377
Sheep	192	Sunspot Minimum and Jensen's Theory	42
Sheep, Dentition	320	Superphosphates Origin	151
Sheep's Feet Septic Infection	176	Sweet Potatoes	57
Sheep Stomach Worms	83	Swine Fever	192
Sheep Wire Worm	381	Syphoning Acid	448
Show Dates	147, 339, 446	T.	
Silage and Stacks	288	Tachinid Fly Parasites	16
Silage as Food	304	Tachinid Fly Parasites of Cano Beetle	207
Silage Stacking	249	Tamworth Pig Breed	412
Slaughtering Acts	193	Tanning Hides	447
Small Worms in Horses	337	Technical Education to Country	456
Smith and Tryon, Bunchy Top Disease	32	Tetanus, Cattle	175
Smoking Out a Cotton Pest	312	Textile Crops, World Production	412
<i>Solanum Seaforthianum</i> Weed	238	Tick Bite Paralysis in Dogs	177
Southern Ghittoe Tree	197	Tick Fever Cattle Immunisation	172
Spraying Experiments	369	Tick Infested Travelling Stock	187
		Tick Pest Suppression	187
		Timber Borer	371
		Tobacco Culture	4, 98
		Tomato Black Spot	349
		Tomato Caterpillar	498
		Tomato Fly	196
		Tomato Grading	387
		Tomato Packing	387

	Page.
Tomato Picking	387
Tomato Pool Board	45
Tomatoes, Stanthorpe	154
Trap Lure Experiments	369
Travelling Stock Infested by Ticks	187
Trees Beetles (Feeding)	207
Trees of Queensland	78, 197, 409, 513
Tryon and Smith's Bunchy Top Investigations	32
Tryon's Citrus Orange Bug	220
Tryon's Common Fruit Fly	220
Tryon's Cotton Worm	220
Tuberculosis of Stock	192
Tussock Moth	196

U.

University and Agriculture ... 356

V.

Vacuum Desirable ...	...	...	...	152
Vine-eating by Cattle (Wild Passion)				326
Vine Rubber Weed	...	...	...	286
Viticulture ...	...	...	...	131

W.

Ward's Peach Culture	...	...	...	13
Warwick Mill and State Wheat Board	443			
Weeds for Identification	...	...	...	448
Weeds of Queensland	...	81, 238, 286,	...	516
Weed Seeds of Frequent Occurrence	...	...	...	182
Weevil Arsenic Preventive (Boll)	...	...	...	342

	Page.
Weevil Destruction by Calcium	
Arsenate (Boll)	495
Weevil, How California Keeps Free	
from Boll	444
Weevil, Wood Borer	195
Wells' Cotton Industry	233
Wheat	55
Wheat Board and Warwick Mill	443
Wheat Industry Development	330
Wheat Trials, New	436
White and Francis's Queensland Trees	78,
197, 409,	513
White and Francis's Queensland	
Weeds	81, 238, 286,
White Ants	158
White Ants and Sugar Cane	372
Wild Peach Weed	81
Wire Worm in Sheep	381
Wood Boring Weevil	195
Woolly Aphis	498
Workers of Queensland	152
World's Cotton Production and Con-	
servation	494-5
World's Textile Crops Production	412
Worms in Chickens	416, 153
Worms in Horses	337
Worms in Sheep	83, 381
Worms of Cotton	220
Worms, Pink Boll	444

Y.

Yorkshire Pig Breed	308
---------------------	-----	-----	-----	-----

z.

Zillmere Egg-laying Competition ... 534

INDEX TO ILLUSTRATIONS.

	Page.		Page.
<i>Ackama paniculata</i> Tree ...	410, 411	Black Soil Road, Darling Downs, in Bad State through Maintenance Neglect ...	133
Adult Banana Beetle Borer ...	72, 529	Black Sow, British ...	518
Agricultural Department Exhibit, Stanthorpe Show ...	244	Boar, Berkshire ...	309
<i>Agrypnus mastersi</i> Pascoe, Larva of ...	89	Boar, Mid York ...	309
Alluvial Flats on Bell's Creek, Callide Valley, Inspected by British Cotton Delegation ...	24	Boar, Poland-China ...	414
A.N.A. Exhibition, Melbourne, 1923 ...	338	Boar, Tamworth ...	413
A.N.A. Exhibition, Queensland Sec- tion, 1923 ...	307	Board Members, Stanthorpe Tomato Pool ...	242
Apple and Gum Pastures, Marshlands, Wondai ...	31	Boll Weevil ...	493
Apple Packing, Conical Shaped ...	396	Boli Worm ...	231-2
Apple Packing, Determination ...	397	Borer Beetle of Banana, Adult ...	72, 529
Apples, Packed ...	387, 393-5	Borer Beetle of Banana, Eggs ...	525
Apple-tree, Black ...	79-80	Borer Beetle of Banana, Grub ...	72, 529
Arndt's Laidley Cotton Farm ...	437	Borer Beetle of Banana, Pupa ...	72, 529
Asilid Larva and Maggot, Cane Grub Enemies ...	89	Borer Beetle of Banana, Pupa, in Corm ...	70
Ayrshire Champion ...	212	Bountiful and Beautiful Burnett from Binjour Plateau ...	439
Baconers, Berkshire and Yorkshire Grades Light Weight ...	520-1	Box, Orchard ...	389
Banana Beetle Borer Adult ...	72, 529	Breeding Cage for Tachinid Flies ...	17
Banana Beetle Borer Eggs ...	525	Bridge in Bad State through Mainte- nance Neglect ...	139
Banana Beetle Borer Grub ...	72, 529	Bridge, Russell River ...	202
Banana Beetle Borer Pupa ...	72, 529	British Black Sow ...	518
Banana Corm, Grub Infested ...	528	Brown's Friesian Heifer, Maud Rooker Korudyke ...	215
Banana Corm Showing Beetle Borer Pupa in Situ ...	70	Buderim to Sea Road ...	340, 343, 345
Banana Corm, Showing Grub Tunnels ...	69-70	Bunya Mountain Road ...	26
Banana Plant Butt, showing <i>C.</i> <i>sordidus</i> Infestation ...	527	Burnett Cattle ...	438
Banana Tariff Protection—Fruitful Argument ...	531	Burnett Cotton Crop ...	439
Baroon Pocket, near Montville ...	340	Burnett Land from Binjour ...	439
Beefwood, Scrub and Tree ...	305, 415	Burning Stack, Smoking Out Cotton Pest ...	313
Beetle Banana Borer Adult ...	72, 529	Butt of Banana Plant, showing <i>C.</i> <i>sordidus</i> Infestation ...	527
Beetle Banana Borer Eggs ...	525	Butter and Cheese Factory Managers' Conference, 1923 ...	503
Beetle Banana Borer Grub ...	72, 529	<i>C. sordidus</i> Eggs ...	530
Beetle Banana Borer in Corm ...	70	<i>C. sordidus</i> Infestation of Banana Butt ...	527
Beetle Banana Borer Pupa ...	72, 529	Cages for Breeding Tachinid Flies ...	17
Beetle, Parent of <i>Agrypnus</i> Larva ...	89	Callide Valley Alluvial Flats Inspected by British Cotton Delegation ...	24-28
Beetle Rhipiphorid ...	97	<i>Campsomeris carinifrons</i> Turner ...	93
Beetles, Cane ...	337	<i>Campsomeris ferruginea</i> Fabr. ...	93
Belle of Longlands, Champion Ayr- shire Cow ...	212	<i>Campsomeris radula</i> Fabr., Life History ...	91
Berkshire Boar ...	309	<i>Campsomeris tasm.</i> Sauss. ...	93
Berkshire Grade Baconers ...	520	Cane Beetles ...	337
Berkshire Sow ...	309	Cane Grubs Predaceous Enemies ...	89
Berkshire Sow and Litter ...	519	Cane, Mackay Experiment Station Plant ...	443
Bin, Orchard ...	390	Cane Sugar ...	123
Black Apple—Fruit, Seed, and Tree ...	79-80	Cattle, Burnett ...	438
Black Plum—Fruit, Seed, and Tree ...	79-80	Cattle, Gindie Stud Stock Farm, Frontis- piece, January, 1923	
Black Soil Road cut up by Wheeled Traffic in Wet Weather ...	133		

LIST OF ILLUSTRATIONS—continued.

	Page.		Page.
Sow, British Black	518	Todd's Biggenden Cotton Field	317, 318
Sow, Mid York	310	Tomato Packing	406, 407
Sow, Poland-China	414	Tomato Pool Board, Stanthorpe	... 242
Sow, Tamworth	413	Trackless Lands on Upper Callide	... 27
Stack Burning in Smoking Out Cotton		Traffic Damage to Roads ...	133, 137
Pest-	313	Trees, Beefwood ... ..	... 415
Stack Construction, Darling Downs	291, 296, 303	Tree, Black Apple ... ..	... 80
Stack of Tarred Rubbish to Windward		Tree, Black Plum ... ..	... 80
of Cotton Rows	312	Tree, Maiden's Blush	514, 515
Stack on T. Chay's Farm, Wetheron...	301	Tree, Marara Rose Leaf ...	410, 411
Stalks Laying by Means of Guide Rod,		Tree, <i>Sideroxylon australis</i> ...	...79, 80
Sledge Cutter	289	Tree, <i>Stoanica australis</i> ...	514, 515
Stanthorpe Prize-winning Exhibit,		Tree, Southern Ghittoe ...	198, 199
Sydney Show	441	Tree, <i>Stenocarpus salignus</i> ...	... 305
Stanthorpe Show Agricultural Depart-		<i>Trema aspera</i> Weed	81
ment Exhibit	244	Vine Rubber Weed	287
Stanthorpe Tomato Pool Board Mem-		Virgin Callide Country ...	26
bers	242	Waggon in which Mr. Leggatt, a	
<i>Stenocarpus salignus</i> Tree	305	Reid's Creek Pioneer Overlanded	
Stock Cattle, Gindie Stock Farm,		from Adelaide Forty Years Ago	... 436
Frontispiece, January, 1923		Wasps, Hyperparasites, Scoliid ...	97
Stud Stock Farm Cattle, Gindie,		Weeds, <i>Oleome Acuteata</i> ...	517
Frontispiece, January, 1923		Weeds, Rubber Vine	287
Stud Stock Studies	212, 213	Weeds, <i>Solanum Seaforthianum</i> ...	239
Sugar Cane	123	Weeds, <i>Trema aspera</i>	82
Sugar Central Mill, South Johnstone	475	Weeds, Wild Peach	82
Sugar Conference Delegates	125	Weevil, Boll	493
Sugar Experiment Station, Gordon		Well Alight, Cotton Pest Smoking Out	313
Vale	77	Wheel Traffic Damage to Road Owing	
Tachinid Flies Breeding Cage ...	17	to Insufficient Thickness of Material	137
Tamworth Boar and Sow	413	Wheeled Traffic Cutting Up of Black	
Tariff Banana Protection, Fruitful		Soil, Darling Downs Roads in Wet	
Argument	531	Weather	133
Tarred Rubbish Stack to Windward of		Whip Hoist, Silage Stack 291, 293, 294, 296	
Cotton Rows	312	Wild Peach Weed	82
Thynnids of Cairns	95	Worm, Boll	231, 232
<i>Thynnus pulchralis</i> Smith	95	Yorkshire Grade Baconers ...	521
Tingoorra Herd of Friesians, Falt's		York Sow and Boar, Mid-	310
Farm	31	<i>Zaspilothynnus vernalis</i> Turner	95
<i>Tiphia intrudens</i> var. <i>brevier</i> Turner...	95		

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PART I.

FRUIT FLY INVESTIGATIONS.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the following Progress Report, No. 7, for the month of November, 1922, of the Entomologist stationed at Stanthorpe (Mr. Hubert Jarvis).

FRUIT FLY—POSSIBLE NATIVE SOURCE.

Visit to Vine Scrub.

On 1st November a second visit was made to the Vine Scrub, about 20 miles from Stanthorpe, and a search was made there for any native host-fruits of the Queensland fruit fly (*Chaetodacus tryoni*); but no such fruits were, however, discovered here on this occasion, nor were any fruit flies seen.

One of the most remarkable features of the investigation was the great scarcity of all insect life in this scrub at this time of the year.

Native Fig.

A visit was also made early in the month to "Donneley's Castle," a rocky eminence about 8 miles from Stanthorpe, on the summit of which two or three specimens of a Native Fig-tree (species at present undetermined) are growing. Although at the time of my visit (in company with Mr. A. Hall, of The Summit, and to whom I am indebted for bringing these trees to my notice) the fruit of this fig-tree—both ripe and in a green state—was plentiful, no fruit fly maggots were found to be present.

LOCAL FRUIT FLY OCCURRENCE.

The following are the records of fruit fly occurrence within the Granite Belt during the month of November:—

On 17th November, 1922, fruit fly maggots, about half grown, were found in mid-season cherries, in the Bald Mountain District, and on the 21st additional specimens were secured—also from there. On 22nd November, fruit fly maggots, each about 4mm. long (hatched only a few days), were found at Applethorpe in two individual cherry plums.

On 24th November, four cherries were secured from the Stanthorpe area, about 2 miles from the town, harbouring fruit fly larvæ—about half grown.

On 28th November, 1922, fruit fly maggots, about 2 mm. in length, were found in Twenty Ounce apples at Bald Mountain, and about one dozen of them were collected showing fruit-fly punctures.

FRUIT FLY HABITS.

Oviposition of Fruit Fly.

It was found that, in the case of cherries, the fruit fly seldom laid more than three eggs in each individual puncture—usually two, but in some cases only one. In the Twenty Ounce apples, however, as many as eight eggs were noticed in one puncture, and seldom less than five eggs.

Number of Eggs in Captured Females of the Fruit Fly.

Twelve fruit flies captured in Twenty Ounce apples contained the following number of eggs respectively:—(1) 50, (2) 19, (3) 13, (4) none, (5) 46, (6) none, (7) none, (8) 36, (9) none, (10) none, (11) 2, (12) 44.

In one dozen fly-punctured apples of this variety, however, only four punctures were found to contain eggs. This seems to indicate the accidental disturbance of the fly, when preparing to oviposit; the sexually immature state of a certain percentage of female fruit flies at the time; or unsuitability in some particular for egg reception of the site chosen.

Development of Maggots.

Young fruit fly maggots, $1\frac{1}{2}$ mm. in length, and apparently only hatched at most forty-eight hours, had, it was found, penetrated three-quarters of an inch into the apple tissue—almost to the centre. The development of the fruit fly maggot in hard unripe apples, must, however, be very slow. It is even, indeed, probable that many eggs laid in this fruit so conditioned either fail to hatch, or if hatching, the young maggots perish through inability to break down the hard fruit-tissue, and secure suitable nourishment.

Use of Lure (Experiments).

Glass fly traps baited with so-called Harvey Fruit Fly Lure (a small quantity of which was given me by Mr. A. Hall, senr., The Summit), have been set at Applethorpe, Eukey, and Bald Mountain, with the following results:—

Locality.	Date.	Time Set.	Variety of Tree.	Number of Fruit Flies Caught.
Applethorpe	28 Oct., 1922	10 a.m.—12 a.m.	Cherry ..	None
" ..	30 Oct., 1922	4 p.m.—5 p.m.	Cherry Plum..	None
" ..	17 Nov., 1922	10 a.m.—12 noon	Cherry ..	None
" ..	24 Nov., 1922	3.15 p.m.—4.30 p.m.	Cherry Plum..	One
" ..	28 Nov., 1922	12.30 p.m.—3 p.m.	Twenty-ounce Apple	One

The fruit flies trapped both proved to be female specimens of the Queensland fruit fly (*Chaetodacus tryoni*).

Laboratory Observations.

Fruit flies have been kept alive in glass jars and fed with honey and water since 8th November, 1922, and although enclosed with various fruits (*i.e.*, cherry, peach, apple, and nectarine) have failed, so far, to oviposit, but no eggs were found in the individual females flies on these being examined. Experiments are being conducted to ascertain if the Solanum fly (*Chaetodacus tryoni*, var. *solani*) will, in captivity, oviposit in cultivated fruit. Solanum flies hatched 6th November, 1922, from material sent by the Entomologist in Chief, 19th October, 1922, have been confined in glass jars with various cultivated fruits procurable, but have failed, so far, to oviposit in any such fruits, although crawling over same with every appearance of interest. The Solanum fruit fly appears to be much more difficult to keep alive in captivity than its near relation *Chaetodacus tryoni*, and it requires greater care in feeding it. Female Solanum flies examined for egg-development, kept in confinement one month after hatching from the pupæ, gave negative results.

CONTROL.

Control Measures.

The fruit flies now present in various localities in the Granite Belt are, I believe, numerically few, and the setting of suitable traps now with a reliable lure, if discoverable, should prove helpful in controlling their increase. It must be remembered that one female fruit fly can do a great deal of damage to the fruit on a single tree,

having (as has been ascertained) from 60-70 eggs to deposit, and probably puncturing at least twenty individual fruits. Still more important than is the use of a lure is it to collect and destroy *all* fallen fruit, and to pick from the tree any fruit seen to be fly punctured, and destroy both. Leaving stung or punctured fruit on the tree is a practice fraught with much future danger, as many maggots develop and leave the fruit, while the latter is still on the tree, more especially so in the case of the stone fruits and the softer varieties of apple. Where the cleaning up is systematically and consistently practised now, early in the season, no serious loss of fruit will, I feel sure, be experienced from fruit fly damage. As I have repeatedly emphasised in former reports, "prevention is better than cure," and no chance should be given the pest to breed: even only one or two, plums or peaches, can cause a good deal of trouble, if maggot-infested and allowed to remain under the trees.

I quite realise that this care in the collecting and destruction of all infested fruit involves a good deal of time and trouble, but it is being practised by some of our most successful growers, having each a very large-area under fruit, and if it can be done by one, it can and should be done by all.

Trapping.

Trapping the fly by means of lures will, of course, be a valuable help in controlling the pest, more especially *now*; but trapping will be of little service if once the fly gets a really good start. Trapping or luring alone will, in my opinion, never constitute a practical control of the fruit fly.

Local Interest.

Being aware, as I am, of the interest being taken in the control of this serious pest, and of the determination on the part of every orchardist to fight it successfully, I feel hopeful of the result this season, knowing that every individual will willingly do all that is in his power, not only in his own interest, but also in the wider interest of the whole district, the prosperity of which depends materially on the successful control of this fruit pest. A prolific source of fruit fly infection to local orchards are (under present conditions) the numerous fruit trees situated in various private gardens in the Stanthorpe town area. Although these trees are well known to our inspectors, it is a matter of much difficulty to keep a continual watch on such trees, at this time of the year, when they are working—so to speak—at high pressure.

Close Observation Necessary.

It is, therefore, incumbent on the owners or residents on any property on which such trees are growing, to see that the trees are carefully watched, and all fallen fruit gathered and effectively dealt with. In cases where these trees are of little or no value to the owners, they should be destroyed, particularly such early fruiting trees as cherries and cherry plums. Recently two large trees of this latter species were brought to my notice by Inspector Williams, who informed me that the fruit on both was badly infested with fruit fly maggots, and this I found to be the case. I cannot too strongly emphasise the danger of such trees—if fruiting and neglected—producing, as they would under such conditions, literally thousands of fruit flies to carry on the work of destruction to later fruits. Were this fact once realised by all who own, and are responsible for such trees, I feel sure that they would, in future, do everything in their power to obviate this danger.

OTHER INJURIOUS INSECTS.

Apple Beetle (Brown Phyparida).

This little chrysomelid plant-eating beetle is, in certain orchards, doing a considerable amount of damage to both the fruit and foliage of the apple. The beetle is just over a quarter of an inch in length, stoutly built, and of a shining brown colour. It is quick to take flight, and it is not easy to capture without a net. It is easily seen, and should be fairly easily controlled with the usual codling moth lead-arsenate spray.

Cutworms and Caterpillars.

Throughout the month, cutworms and other caterpillars have been destructively busy among vegetables. Specimens of the latter received from the Broadwater district as damaging tomato plants, proved to be the larvæ of the well-known Noctuid pest (*Chloridea armigera*). This pest attacks a variety of cultivated plants. Probably an effective spraying with a reliable arsenical spray, early in the growth of the plant, and followed by similar spraying at about fortnightly intervals for a couple

of months or six weeks, will be found a fairly satisfactory method of dealing with this insect. A poison bran bait recommended by the United States Department of Agriculture for cutworms (*Agrotis* spp.) is as follows:—

Wheat bran, 50 lb.; Paris green or white arsenic, 1 lb. (or powdered arsenate of lead, 2 lb.); low-grade molasses, 2 gallons. Of course any quantity can be made, provided the correct proportions are observed.

The bran and arsenic are first mixed together dry, and the molasses is then added. Under dry conditions, salt, at the rate of 5 lb. to 50 lb. of bran will keep the bait moist and render it more effective. The addition also of six finely chopped lemons or oranges to the mixture has been found advantageous in coping with certain cutworm species.

FRUIT-FLY—NORTHERN NEW SOUTH WALES.

Inspection.

Visits of inspection have been made to the following places during the month:—Bald Mountain, Broadwater, Ballandean, Beverley, Sugar Loaf District, The Summit, Applethorpe, Eukey. A visit was also made to the Liston, Amosfield, and Wylie's Creek Districts, in company with the New South Wales Fruit Inspector, J. Lindsay, in order to direct him to various places where abandoned orchards, visited by the Government Entomologist of New South Wales and myself in June-July last, existed. (A report, the outcome of this visit, dated 18th December, has already been submitted.—H.T., Entomologist.)

Fungus Diseases.

Several diseases of this nature have been referred to the Government Entomologist and Plant Pathologist, Mr. H. Tryon, whose reports on the same have been in due course received.

TOBACCO CULTURE—I.*

By M. P. MARTIN, Chief Controller, Tobacco Industry, Madagascar.

Translated by MAJOR A. J. BOYD.

The latest "*Bulletin Economique*," published by direction of the Governor-General of Madagascar, contains a very informative article on Tobacco Culture in Madagascar and on the East Coast of Africa. Methods of cultivation and after treatment of the tobacco crop, which will interest Queensland growers, are exhaustively set out, and from this article the following interesting notes have been abstracted.—Ed.

CLASSIFICATION OF TOBACCO.

- A. Heavy Tobaccos.
- B. Light Tobaccos.

Heavy Tobaccos.

Heavy tobaccos are defined as tobaccos highly charged with nicotine. These can only be used in the manufacture of snuffs and in the shape of twist for chewing. In point of fact the requirements of the manufacturers are restrictive and show a tendency to become less still, as the habits of snuff-taking and tobacco-chewing are falling into disuse in every country. Hence, the production of heavy tobaccos is not desirable. The varieties producing them should, therefore, no longer be cultivated, except, perhaps, in localities where the cultivation of light tobaccos is not possible, either on account of the azotic contents of the soil, which tends to increase, notwithstanding all the nicotine contained in the leaves, or else because the presence of chlorides renders these tobaccos completely incombustible.

Light Tobaccos.

These may be subdivided into three principal categories:—

1. *Cigar Wrappers*.—Tobacco for wrappers, that is, an external covering for cigars. The leaves intended for this purpose should present a fine resistant tissue, nerve veins scarcely perceptible, very far apart, and exhibiting a very obtuse angle

**Bulletin Economique de Madagascar*. La culture du Tabac a Madagascar (Extraits du rapport de M. le contrôleur principal Martin, des manufactures de l'Etat en mission à Madagascar).

with the centre vein. The colour must be uniform and pleasing to the eye, and the combustibility perfect. The cultivation of this class, however, is not advisable; in fact, it would be better to advise the withdrawal of plants capable of being utilised as wrappers, as all the advantage which might be expected from them is nullified by the amount of hand labour it entails; and hand labour is expensive and almost unattainable in Madagascar, as well as in other tropical countries, such as Queensland. Failing sufficient care or suitable labour during the process of drying or in gathering the leaves, or delivery and storage, the expected returns would be far from being realised.

Small experiments should be made, which would give precious information, but stress is laid upon this:—That one should avoid, for the present at least, attempting to produce, at all events on a large scale, leaves intended for the wrapping of cigars. Once having been refused by buyers as cigar wrappers for some reason or other, such leaves would only be accepted as scraps, and the cash return would be as much less according as the leaves are of less weight.

2. *Aromatic Tobacco*.—In this category is included such tobaccos as present a well-developed and agreeable aroma, such as originated in Maryland or in the East. These tobaccos evidently command a high price, but only under the express condition that they retain the desired aroma. Seed, direct from a plantation situated in a high position, should yield from a first planting at the least plants similar in appearance to those of their parent plants, but from which the necessary qualities will have disappeared more or less entirely. The aroma, to which certain classes of tobacco owe their high price, is the result of certain things as yet uncertain. It is due to the soil and to the climate, and in all points may be compared to the bouquet of good wines. Everyone knows how, in France, the crops are catalogued and show the individual qualities which it has been found impossible ever to reproduce elsewhere. Can it be admitted the cultivation in Madagascar of the vintages of Bordeaux or Burgundy would be capable of producing such incomparable wines, or those which had been produced in their native home? It is exactly the same in the production of aromatic tobacco, and the production of the original seed with another well-authenticated seed is not a guarantee of quality. Several small experiments made in different parts of the island gave rise to a hope that well-defined localities will be in a position to produce tobaccos with a fine delicate aroma, but these must be increased before any certainty can be arrived at.

3. *Ordinary Mixed Tobacco*.—The requisite qualities of the tobaccos of this group are more restricted. To be exportable, it is sufficient that they be well cured, fairly combustible, and not possessing any disagreeable taste. According to the qualities of each lot, so will the sale price vary.

SOWING THE SEED.

A cubic centimetre of seeds weighs $\frac{1}{2}$ gramme, which means 7,000 to 8,000 seeds, which is more than are required for sowing a square metre. A sewing thimble makes a good measure, and will hold sufficient seed to sow from 2 to 3 square metres of land. Too thick sowing necessitates thinning out the plants in the seed bed, which is injurious to those left to grow for planting out. When they are too crowded in the seed bed, the stems of the young plants become very thin, and the leaves are narrow and tapering, and this malformation continues after they have been planted out in their permanent positions. Furthermore, the rootlets become a tangled mass, with the result that after transplanting recovery is slow and difficult, so many young fibrous rootlets being violently broken. Too close planting will necessitate fresh planting out, and, so to speak, wet-nursing them. All this necessitates extra labour for a long period, which might have been avoided by greater care when sowing the seed.

Now, when the seed bed has been carefully and lightly sown, the young plants develop normally, they become thick in the stem, short and equal in size, and the leaves are larger. The seedlings sown with due care can be withdrawn from the bed without injuring the roots, and may be transplanted with every chance of their thriving rapidly.

To obtain on a widely-sown seed bed a uniform distance between the seeds, this can be done easily, notwithstanding the minute size of the seeds, by mixing with the latter 20 to 30 times their volume of fine charcoal cinders (ashes). Sow gently broad cast, and when there is no wind. The seed and cinders fall together to the ground, and the grey colour of the ashes enables the sower to regulate the fall of the seed. The latter, owing to their minuteness, should not be deeply sown. The best plan is to cover them with a bed of very fine earth, scattered uniformly, using for this purpose some kind of sieve. Then use a light plank laid on the bed, the

slight pressure of which causes the adhesion of the seeds to the soil, which latter should be constantly kept moist, but not too wet. All that remains to be done is to shade the bed by means of screens or bushes from the direct rays of the sun, and finally to keep down the weeds by frequent hand-weeding.

CHOICE AND PREPARATION OF THE LAND.

Although tobacco will grow on all kinds of soil, it should, in order to obtain good results, only be cultivated on soils of high fertility, which are not too moist. As a general rule, it may be admitted that heavy soils produce a coarse plant rich in nicotine, and that light soils produce a finer quality of leaf containing less alkaloids, and, consequently, of greater commercial value. A soil very rich in azote (nitrogen) increases the percentage of nicotine in the leaves, destroys their colour, and increases the difficulty of their desiccation and conservation by increasing hygrometric power. A soil rich in azote results in fine, well-coloured, very combustible, and easily prepared leaves, owing to their being less sensitive to variations of the atmosphere. Soils full of chlorides, frequently met with near the sea-coast or at the mouths of rivers, are not suitable for the cultivation of smoking tobacco, the product derived from such soils being absolutely incombustible.

In Madagascar, the difficulty of obtaining manures does not enable the grower to modify, as he would desire, the chemical composition of the soil. On the other hand, in all the districts in which the cultivation of tobacco can be advised, azote exists in sufficient quantity; indeed, it is usually found in too large a percentage. Beyond farm-yard manures, the only element to be recommended for use is potash free from chlorides, in the form of sulphate or carbonate, to the absolute exclusion of chlorides, which would destroy combustibility; hence, the ideal potassic manure is, as stated, the sulphate of potash free from chlorides.

Unfortunately, the price of potash manures is too high at present, but a substitute may be used to almost equal advantage in the shape of the ashes from many indigenous plants, which contain from 12 to 16 per cent. of potash, which should be freely scattered over the land before ploughing, with excellent results at once. With deep cultivation, the land so treated will yield infinitely greater returns than those which have only been, so to speak, scratched on the surface.

TRANSPLANTING.

As soon as the young plants in the seed beds have sufficiently developed—that is to say, when they have obtained a height of 5 or 6 inches—they will be ready for transplanting. Previously to this, the seed bed should be copiously irrigated and the water allowed to sink into the ground to facilitate the withdrawal of the seedling plants, an operation which must be carefully done in order to avoid injury to the rootlets.

The planting out must be quickly carried out, taking time, however, to select the strongest plants and as many as possible of equal size. All those which appear drawn up and slim, all spotted ones, or of pale colour, those whose root system is badly developed must be ruthlessly rejected. Plants well rooted, thick and short, with large leaves spreading over the soil and having a beautiful, uniform, deep-green colour should be the only ones transplanted, because these alone are capable of good development in the field.

The planting in their permanent places in the field is done with a planting stick or trowel, in cloudy weather if possible, or else, in the evening, and every precaution should be taken that the roots be not turned upwards or planted in a ball, and gentle pressure must be applied to ensure their adherence to the soil up to the crown. If improperly planted, the plant grows badly, becomes emaciated, and will be of little value. On the other hand, if the heart is embedded, the plant quickly dies. Watering is unnecessary, except when the soil is actually dry; in this case a single glass of water per plant is enough to ensure its striking; but directly after this watering, a slight covering of soil well crumbled should be shaken over the watered soil in order to prevent too rapid drying, which would harden the watered part and enclose the young roots in a block of compact soil highly prejudicial to the eventual development of the plant. Nothing further now remains to be done beyond providing some protection from the direct rays of the sun.

(TO BE CONCLUDED.)

SUGAR : FIELD REPORTS.

The Southern Field Assistant, Mr. J. C. Murray, Bureau of Sugar Experiment Stations, reports under date, 13th December, 1922, as follows:—

In the course of the month of November cane areas around Bundaberg, Gin Gin, and Childers were visited.

Woongarra.

On this section of the Bundaberg sugar areas there is every chance, provided normal rains occur within the next six weeks, of a good crop. In the face of unusually dry weather during the past six months, the young plant and ratoon crop look very healthy, and, as the weather seems now very broken, a severe setback is improbable.

As previously pointed out, in reports on this district, the extraordinary hardness and drought resistance of the young cane this year is probably due to better and deeper tillage. Growers are recommended to persist in this, especially in its relation to surface cultivation, so that the capillary soil tubes may be kept broken and moisture prevented from escaping.

Canes still making a good showing are Shahjahanpur No. 10, Q.813, H.Q.285, and 1900 Seedling. The first-named is rapidly coming into favour. This variety is 70 per cent. frost resistant, is of good sugar content, strikes, grows, and ratoons well. It is not heavy in the stick, but the number of canes to the stool make up for any deficiencies in this respect.

H.Q.285 is a variety that is going to give the farmers good returns if well selected and cultivated. It has shown no great resistance to frost, but is a good general cane, with early-maturing properties. The farmers are justified in planting this cane with any of the mid-season maturing varieties. The other canes mentioned above are well known varieties and both suitable for extensive planting on moderately good soils.

Barolin.

This area is also showing extensive fields of green cane, and prospects look brighter for a big crop than for a number of years. Very few suggestions could be made to improve cultivation. A tendency to cultivate young plant cane with implements that are inclined to propel a little too much earth on to the plants is observable.

Growers are getting good growth from the Shahjahanpur No. 10, 1900 Seedlings, Q.813, M.189, Q.970, Q.1121, and Q.1098. The three first-named are giving the best results; some very fine fields of all three varieties having been seen. The first named appears to be coming much into favour, especially on any land that is frosted or not particularly rich in plant foods.

Except for slight frost check in the winter time, the Barolin farmers should in the future make good progress. Most of the farms are easy to cultivate and drain, and present no complexity regarding feeding the soil, at least as far as can be observed by local results. Cowpea, Mauritius bean, and maize have given positive results as green manures; products of meatworks have also given payable results to the farmer. It is probable in applying lime to these soils that light applications of burnt lime with each ploughing would be better than a heavy application after each half dozen years. On this forest loam it is practically certain, from present observations, that lime would be beneficial, especially before ploughing in a crop of green maize, or in fact any green manure.

At present there is a large quantity of animal manure lying about the paddocks adjoining dairy farms. Cane-growers are reminded that this manure is good material, and the grower that avails himself of it will be amply rewarded for a little extra work involved.

Sharon.

The cane here looks well, and the growers have no need to fear a dry spell. However, the necessity to cultivate exists strongly. There is still a great deal of land in the Sharon district that would grow cane, but owing to the present unsettled state of the industry the farmers are doubtful about further development.

Gumming is in evidence in D.1135. Control of this disease has been referred to in previous reports. The most important measure is careful selection of plants, discarding of tolerant or susceptible varieties (D.1135 could be classed as tolerant), and the fallowing of land whereon the disease has been found for a period of twelve months. Farmers here are advised to give Shahjahanpur No. 10 a more extensive trial than they so far have done. Growers are also advised to experiment with sulphate of ammonia and nitrate of soda, with a view to determining their value as fertilisers calculated to force along backward ratoons.

Gin Gin.

At the time of visiting Gin Gin the country was dry, but, nevertheless, the cane looked healthy. The farms are very well tilled, and the prospects of a good crop next year are good. Grubs are doing a certain amount of damage on some farms, although the mischief done is not sufficient to cause any concern. Growers are reminded that by constant cultivation the grub is harassed and, to a certain extent, destroyed.

Good results during the past season have been obtained from M.1900 Seedling, D.1135, H.Q.426, H.Q.285, and Q.813. During future planting operations in this district it will be necessary to be most careful in plant selection, especially with D.1135, and farmers should take the opportunity of changing plants from an alluvial or granitic to a volcanic soil. Changing plants invigorates the variety and maintains it true to good type, at least it greatly helps the useful work done by careful plant selection.

Childers.

Childers presents a picture like a sea of rippling green. The great bulk of the crop next year will be ratoon, as not much planting has been done this season; there will also be a small acreage of standover.

Farmers are realising the necessity for disturbing the soil deeply, if they are to combat, in a measure, the dry season, and are strengthening their teams and adjusting their implements accordingly.

Varieties making a good showing here just at present are M.1900, Q.813, Q.1098, H.Q.285, and D.1135. The latter variety is showing a considerable amount of gum, and it would be wise if growers who are affected could spell these areas for a number of months, and reintroduce cane of the same variety, say, from the Maroochy River, where a fairly healthy set of conditions prevail.

Disease is appearing in other varieties, but there is no indication of anything that need cause misgivings. Small areas of Shahjahanpur No. 10 are in existence. This is a cane that should be more extensively planted, as it has many qualities that should recommend it to a man on low-lying ground. An idea appears to be abroad that this cane is diseased. This is entirely erroneous; the fact that it was issued by the Bundaberg Sugar Experiment Station should be sufficient proof that the cane is healthy.

Most of the growers in this district contemplate fertilising extensively in the future. As previously reminded, they should make full use of the facilities provided by the Bureau for soil analysis. Growers at present are not getting anything approaching adequate returns for the money they expend in fertilising, mainly on account of no methodical preliminary work. It is an error to be too conservative in these matters.

The Northern Field Assistant, Bureau of Sugar Experiment Stations (Mr. E. H. Osborn), reports under date, 1st December, 1922, as follows:—

Mossman District.

Generally speaking, the condition of the crops compared very favourably with any seen further South.

Up to the end of October 73.43 ins. of rain had fallen—

							Inches.
January	..	..	..	..	..	..	9.25
February	..	..	..	..	..	..	23.54
March	..	..	..	..	..	..	23.08
April	..	..	..	..	..	..	6.13
May	..	..	..	..	..	..	4.25
June	..	..	..	..	..	..	1.58
July	..	..	..	..	..	..	2.34
August	..	..	..	..	..	..	.85
September	..	..	..	..	..	..	.45
October	..	..	..	..	..	..	1.96
							<hr/>
							73.43

Ratoons look remarkably well, and better than most ratoons seen elsewhere.

The crushing, although resulting in a lighter tonnage than previously expected, was very satisfactory. No labour troubles of any kind had caused delay to the successful working of the mill.

In previous notes mention was made that the principal canes grown in the area are:—D.1135, Black Innis, H.Q.426, Badila, B.147, and the Gorus (24A, 24, and 24B), with M.Q.1 (Mowbray Seedling). In several cases the last-named has given good results this season, both as regards tonnage per acre and also as to c.e.s. values. Mr. Arthur Rex considers that a few acres he grew on a fairly rich flat gave him a return of 35 tons to the acre, and his density returns were also very fair. After cutting the ratoons this cane grew very vigorously. This grower, after having had soil analysis made, has limed and sown with beans an area to plant later on, and compare results with other blocks not so treated.

Messrs. Crees Brothers have gone to a lot of trouble to keep their nursery up to date. They now have a very good strike of Gingor, Obo Badila, H.146, H.109, E.K.1, E.K.28, H.Q.458, Oramboo, and Nanemo. These planters deserve commendation for the care that they are always ready to give to any canes likely to be of benefit to their particular district. They are also growing a very fair quantity of B.147 upon the farm. This cane is rather a favourite in the Mossman district, as it is claimed that at thirteen months old it often gives a 30-ton to the acre crop, has a good average density, and also is a good striker. D.1135 still continues to give good results at the Mossman. Mr. J. Clarke cut a thirteen-months' old crop of 6th ratoons going 15 tons to the acre and a c.e.s. of 16.2. Badila grown alongside gave about the same tonnage per acre, but its density was only 16.0. On Mr. R. Rex's farm nearby, but upon high land (manured), a crop of 1st ratoons of this variety gave as high as 38 tons to the acre, and carried a density of 15 c.e.s. Q.813 has not so far been grown to a large extent, but an increased area has been planted out for next year. Pringle Brothers' returns from this cane are, however, worth noting, for a thirteen-months' old crop of 1st ratoons went 20 tons to the acre. The average c.e.s. of six samples of this was 15.61, against the average mill sample for the same days of about 14.5 c.e.s.

Bowen District.

The rainfall record up to 23rd November was only 24.29 inches—

	Inches.
January	5.12
February	12.94
March	2.41
April .. .. .	.13
May .. .. .	.11
June .. .. .	.50
July	2.40
August	—
September .. .. .	.25
October .. .. .	.18
November (to 23rd November, 1922) .. .. .	.25
	<hr/> 24.29

Naturally, with such a very poor fall, the cane areas (except where irrigated) looked at their worst. Luckily most of the farmers have small plots, and where these have been used the cane looks very promising. A certain amount of planting was also taking place, but in nearly all cases the land had been watered prior to planting. Also in most cases the plants had been "soaked" for a day or so.

A feature of the district was the number of new wells that have and are being sunk, and also the number of pumping plants that have been installed recently.

Mr. Burrell has a couple of wells in use, and has just ordered a tractor for cultivation work and also to pump with.

A demonstration given for pumping purposes caused him to decide upon getting a similar tractor.

Mr. J. Maltby uses a portable engine for pumping upon his farm, and claims and shows very good results from its use. This planter has had a very good strike with a number of canes lately obtained from the experimental plot upon the Home Hill State Farm. After liming with about $\frac{1}{2}$ of a ton of earth lime to the acre, watering the drills, and using about 5 cwt. meatworks manure per acre, he planted the following:—M.Q.1 (Mowbray Seedling), Tableland Badila, B.208, Hybrid No. 1, M.1900, Q.855, and E.K.28. So far, the growth is vigorous.

It is very interesting to note that many more farmers than formerly are now using manures in this area.

CALIFORNIAN METHODS OF POULTRY RAISING AND MARKETING—I.*

In view of the widespread revival of interest in the poultry industry the subjoined article reprinted from the Journal of the Ministry of Agriculture, United Kingdom, and compiled from a Consular Report, will be regarded as of exceptional relevancy.—Ed.

It is a commonplace that the conditions under which many American industries have grown up have produced organisations different in many respects from those of Europe. The difference in conditions, however, has not been so great as to preclude the adoption in Europe of American methods, where these are found to be of value. Advantage has, in fact, so frequently been taken of American experience that it is the more remarkable that poultry-farming organisation in that country has hitherto been so little reflected in British methods.

That poultry-farming practice in the United States is worthy of investigation is shown by the following salient facts:—That 22,000,000 dozen eggs and 240,000 dozen poultry were shipped in 1920 from a district in California some 50 square miles in extent; that a farm of 2,500 hens is considered to be one man's work; and that an annual net profit of 1 dollar ten cents (normally 4s. 7d.) per hen is considered a somewhat low average.

It is true that the soil and climate of California are contributory causes of these arresting results, but they are by no means so important as is frequently held. The settlement which it is proposed to describe is only one of several in California, and the methods of all of them are common to most poultry-farming centres in America, even to those in the Eastern States, where the climate is less suitable than in England. Further, the methods and devices described below must not be regarded as the chief cause of prosperity; they are themselves the outcome of a business prosperity founded on three main principles—hard work, cleanliness, and attention to detail. There are no illusions in such communities regarding the exacting nature of the work necessary for success in poultry farming, and unremitting attention is everywhere evident. The importance of cleanliness and adequate disinfection is also recognised. Dirt and disease are destructive of the results of so much labour that it has become an imperative business principle to avoid them. A continual application of these three principles has been a prime factor in creating the organisation which it is proposed shortly to outline.

This organisation has its centre at Petaluma, a town of some 6,000 inhabitants, situated near the northern extremity of San Francisco Bay. It is the headquarters of the small district which, as already stated, produced over 22,000,000 dozen eggs in 1920, and, although apparently the largest poultry-raising community in the world, may be taken as typical of many similar centres throughout the United States.

Poultry Hatcheries.

The poultry-raiser of Petaluma usually obtains his stock from one of the "Hatcheries" of which there are several in the town. One of these, which may be taken as typical, hatched out 1,000,000 chicks in 1921. The eggs are bought at about 10 cents above current prices by the hatchery, which is a business concern, and in no sense co-operative. The resultant chicks are sold at about three times the price of the original eggs. Eggs for hatching are bought from specially selected ranches known to the hatchery as possessors of highly productive strains; in some cases the hatcheries themselves supply cockerels, and are thus in very close touch with the pedigrees of the birds whose eggs they hatch. The incubators are arranged in tiers on racks in a large room and are heated by gas or electric appliances regulated by thermostats, of which there is one in each chamber. The air is kept comparatively moist by leaving the ground beneath the racks exposed, only the alleyways between being paved. This is scarcely sufficient for the upper ranges of incubators, and where necessary further moistening is provided by means of pans in the incubators. The eggs are turned by hand, the trays being grooved to make this task easy. The owners of the hatchery in question prefer this method to mechanical turning, as their experience shows that the mechanical method is productive of a considerable percentage of abnormal chicks. By the hand-turning method, combined, of course, with careful tending throughout the hatching period an average hatch of 80 good chicks in every 100 is obtained.

When the newly-hatched chicks have been dried off they are placed in ventilated boxes containing four sections of twenty-five chicks each, for delivery. Frequently of course, local poultry farmers arrange to receive back the chicks hatched from eggs

* From a report drawn up by H.M. Acting Vice-Consul at San Francisco and communicated through the Department of Overseas Trade, U.K.

supplied by themselves, but large numbers of day-old chicks are sent considerable distances to the hatchery's customers. It is found possible to send day-old chicks on a seventy-two-hour journey without injury or prejudice to their subsequent growth.

An interesting feature of the organisation of the hatchery under notice is that one of the partners, who is a qualified veterinarian, is placed at the disposal of all purchasers of day-old chicks who live within a reasonable distance. If any trouble arises or if any advice is needed his services are invoked. This procedure is of great value to the hatchery, both for purposes of advertisement and because it ensures a larger percentage of survivals than would otherwise be the case. The veterinarian further justifies his existence by superintending a model poultry farm owned by the hatchery.

Brooding.

A great deal of attention is naturally given to the brooding of young chicks, and numerous types of houses and machines are in use. One of the favourite methods is by the use of what is known as the "Kresky" house. This consists of two rooms, one of which is kept heated at 75 degrees F. by means of an oil stove and thermostat, the second being considerably cooler. A small entrance is provided from the warm to the cool room, and from the latter to the chicken-run, so that the chicks may accustom themselves to the different temperatures. The room floors are usually covered with some form of warm, dry litter, and the corners are rounded off to prevent suffocation of chicks by crowding into corners.

Trays of grit are placed in both rooms, and frequently a continuous water supply and food supply is provided.

This form of house appears very useful for large numbers of chicks. The owner of a "ranch" in Petaluma recently raised 6,000 chicks in four Kresky houses each room of which could not have been more than 20 ft. by 16 ft. Including the open-air "run," these 6,000 chicks were raised in an area of less than half an acre; and, although their owner, having neglected to separate his cockerels at the earliest possible moment, was, in this case, risking loss by overcrowding, there is no doubt that chicks are brooded successfully in very confined areas. One square foot for young chicks and two square feet for hens and pullets is the room considered desirable here.

Various forms of smaller artificial brooders are in use. The majority of these are heated by oil or coal stoves. This method has the advantage of needing only one house instead of two, as with the Kresky method. An electric brooder of orthodox design was also seen, the heat being supplied by wire coils beneath the floor of the brooder. In all cases regulation is provided by a thermostat which, in the case of the electric brooder, showed a small light when current was being used.

The size of the flocks of young chicks placed in the brooders is a feature of Petaluma. The batches vary from 500 to 6,000, 2,000 being a frequent quantity. The cockerels are separated at the earliest possible moment. Success is only due to detailed personal attention to such matters as feeding, ventilation, control of light, and care that the chickens do not damage each other by toe-picking, overcrowding, and so on.

Houses.

The Chamber of Commerce of Petaluma encourages the use of trap-nests and modern hen-houses by means of egg-laying contests and kindred activities, while, as will be shown later, the methods of the co-operative egg-marketing association make it to the interest of the poultry farmer to use the most scientific methods possible. Many of the Petaluma ranches still retain the "colony" type of hen-house with a common run for several houses, but these are being supplanted, whenever possible, by more modern types of houses. The scheme now being adopted is to provide a house accommodating some 3,000 hens, the house being divided into sections each holding about 250 birds. A separate run is provided for each section, and where possible, a double run system is used, the runs either being arranged on both sides of the house or divided longitudinally on one side only.

Trap-nest systems appear generally to be confined to ranches producing eggs for hatching, and the majority of the farmers rely on their experience in judging the qualities of a hen, combined with the system known as "Hoganising" (i.e., the handling test).

The houses of the poultry farm owned by the hatchery described below may be taken as typical of the principle upon which Petaluma farmers work, though in practice possibly not many of the ranches are so scientifically organised throughout.

The houses on this ranch, some 50 ft. long by 20 ft. wide, are built to accommodate 500 hens. They are lighted by muslin-covered windows and by electric light. The roosting perches run lengthways, are movable, and on one level. They are wide enough for the hen to perch without grasping with the feet, as this form of perch

is considered to be less tiring for the hen, and hence to contribute something towards its egg-laying capacity. Beneath the roost is a dropping board, some 3 ft. 6 in. from the ground and 12 in. below the perches. These arrangements leave the whole of one side and one end of the house for trap-nests, which are placed at a height of about 4 ft. from the ground, to make egg-collecting easy.

One trap-nest for every three hens is found to be sufficient, eggs being collected every hour, and credited to the record of the hen. A bucket is suspended by a wire moving in front of the nests, so that no stooping or unnecessary labour is entailed. In so exacting a business as poultry farming on this scale, such labour-saving devices are invaluable. Clean dry litter is kept on the floor and covered-in water-troughs are provided at a height of 18 in. to 2 ft. from the ground to prevent litter being scraped into the water. Feed mixtures are placed in a dry-mash hopper. It appears that the advocates of dry and wet mashes are fairly equally divided, though probably slightly more dry mash is fed on account of the saving in labour as compared with the wet mash, a dry hopper needing to be filled only once or twice per week. Where wet mashes are used they are mixed with green food to avoid wastage. Many successful farmers pay great attention to the supply of green food, care being taken to provide different varieties.

The problem of the fouling of land in Petaluma Valley is a comparatively easy one. The soil is almost everywhere a light, sandy loam, porous, and productive; the climate is mild and equable; and, the district being well provided with small hills, natural drainage is almost universal. Under these conditions the double-yard system can be used to the greatest advantage. A foul yard is ploughed up, limed, rested for a few days, and then sown with quick-sprouting seed. At the end of three weeks there is usually a growth some 6 or 7 in. high, and the hens can be turned on to this. It is thus possible to confine the birds to an area which they will completely foul in three or four weeks, and by carrying out the process described above, to keep a large flock of poultry on a very small tract of ground.

The Feeding Problem.

The dimensions of the poultry-farming industry here have resulted in simplifying the feeding problem also. There are several grain merchants established in the town who import their grain from the neighbouring Sacramento and San Joaquin Valleys by cheap water transport. They mix their feeds in Petaluma itself and by establishing carefully composed brands of uniformly good quality, have materially reduced the poultry-farmers' cares while ensuring a constant market for their goods. Most of the grain and meal seen in the repositories was of good quality and remarkably clean. It is a noteworthy result of the magnitude and intensiveness of the Californian agricultural industries—in fruit-growing and dairying as well as in poultry farming—that great importance is attached to the grading and branding of the various products. The producers themselves are so well aware of the commercial value of a good reputation for their goods that they go to considerable trouble to keep their brand uniform in quality, and are the more ready to place confidence in the branded grades of producers of other articles.

The buyer of poultry foods in Petaluma is, therefore, almost always willing to trust to a known mixture and rarely finds his trust misplaced. He is able, in consequence, to free himself from the necessity of growing or mixing grain himself.

Culling.

Another point upon which stress is laid is the elimination of the unfit or "culling." Unfit or unpromising chicks and bad layers are weeded out constantly on the principle that food is lost if given to an unworthy bird. The average bird is expected to lay 120 eggs in a year, and if she falls below this standard by the trap-nest or other record, she is sacrificed without compunction.

Co-operative Sale of Eggs.

It is after the collection of the eggs that the poultry farmer comes within the sphere of influence of the co-operative society known as the Poultry Producers of Central California Incorporated. Some 75 per cent. of the Petaluma farmers belong to this organisation, which concerns itself with the marketing of the eggs. The farmer is expected to clean the eggs if necessary with a wad of steel wool (this having been found to be by far the most effective and least injurious method) and to grade them according to their size, colour, and degrees of dirtiness. He buys egg-boxes holding thirty dozen from the co-operative society, and delivers them himself, when packed, at the society's dépôt. The society's organisation makes it capable of obtaining the best and most stable price possible for eggs the receipts being credited to the farmer according to the quantity of eggs which he has delivered.

[TO BE CONCLUDED.]

PEACH CULTURE.

By J. M. WARD, Senior Instructor in Fruit Culture.

PROPAGATION.

The peach is generally grown from pits (seeds) and the variety required budded on to the seedling in January. In selecting pits, preference should be given to those from strong-growing peaches. Sometimes the hard shelled sweet almond is used as a stock; this is not generally satisfactory, except in a dry soil, the almond standing a dry situation better than the peach. When it is intended to plant on a wet soil the plum stock is used, as it will stand a more moist situation than will the peach roots. In this case the St. Julian or Myrabolan plum should be used, the former being the better of the two. Generally speaking, peaches are best worked on their own roots by budding on to the seedling; grafting is very unsatisfactory.

SOILS.

The range of soils for the peach can be somewhat extended by the choice of stock for budding upon. The best peach soils are light, deep sandy loams, more dry than most, good drainage being essential. They will thrive on land with a mixture of coarse sand and gravel, providing it contains the needed elements of fertility. For rapid growth and heavy fruiting the peach requires abundant nutriment. Therefore, where the land is of a poor nature it must be enriched by thorough manuring.

DISEASES AND REMEDIES.

The diseases that attack the peach tree are numerous: it is attacked by several forms of fungus, the most troublesome of these being curl-leaf (*Exoascus deformans*). It is also attacked by the black aphid (*Myzus cerasi*) and by the green aphid (*aphis persica*). For curl-leaf and other fungoids the tree should be sprayed with the Bordeaux, Burgundy, or lime-sulphur mixture just before the buds burst (about the beginning of August (using the 4.4.40 formula; spray again after the fruit has set at half strength of this mixture).

The aphid infests every part of the tree—roots, branch shoots, leaves, and young fruit—in incredible numbers, and as the whole of their nourishment is obtained by piercing the bark or leaf, inserting the beak or rostrum and sucking up the juices, it may readily be seen how very exhausting to the tree a severe attack must be. For destroying the root form of aphid, during the winter months, remove the soil a little for a few feet around the trunk of the tree, and sprinkle over the roots a few handfuls of sulphur, or pour over the roots 3 or 4 gallons of sulphate of copper (bluestone) mixture, using $\frac{1}{2}$ oz. of bluestone to 1 gallon of water. If tobacco dust or leaves are procurable it can be used instead of the above; sprinkle and dig it in around the tree. To destroy the aphid on the upper portion of the limbs thoroughly spray every part with McDougall's insecticide, kerosene emulsion, or tobacco wash, such as Black Leaf 40. Continual spraying at frequent intervals is necessary, as the insect continues coming in countless numbers. It is necessary to spray with the Bordeaux or Burgundy mixture, or lime-sulphur, every spring, even if the curl-leaf does not make its appearance for one season. By continual spraying with a fungicide the tree is kept in a healthy condition, good fruit resulting.

PRUNING.

After spraying to keep fungoids down, the pruning of the peach is the most important matter to the grower. If the tree is not kept healthy pruning is useless, for the peach must be in a robust condition to make the pruning a success.

The pruning of the peach is, like that of the plum, greatly misunderstood by the majority of fruitgrowers, resulting in small crops of fruit being picked from the tree, and what few fruit there are are mostly gathered from the top of the tree or the ends of the branches, most of the wood being almost destitute of leaves and fruiting laterals. The fruit of the peach tree only comes on one-year-old wood; occasionally some varieties fruit on spurs, but this only rarely takes place. One must rely only on one-year-old laterals for his crop, otherwise he will be sadly disappointed. It is the common practice among those who have not studied the habits of the peach to let it grow entirely unpruned; this results in heavy crops while there is young wood in the tree. The new growth will fruit, then become barren, the peaches again appearing on the new wood that has extended from the place

where the fruit was previously gathered. Each year the new growth is weaker and shorter, and gradually the lower portion of the tree becomes devoid of fruit and is of little value, except for acting as a channel to convey a supply of sap to the upper portion of the tree, where the foliage is most dense, and where—when the tree is in such condition—it is most needed. This is not the state in which a peach tree should be. The young growth should be evenly distributed over the whole tree, especially over the lower portions. To obtain the desired effects the tree must be given proper and skilful treatment from its earliest inception, and trained in such a manner that the main arms are well placed and strong, so as to be able to stand the strain of heavy crops without breaking. To have a tree in this state one must start with the yearling tree as received from the nursery; it is either one that has been pinched back in early summer and has developed three or four good leaders or one that has grown straight up and has several short laterals. To start the latter in the way it should be trained, choose the strongest laterals at a distance of about 15 inches from the surface of the soil, then cut the remainder of the tree away at the base of the foremost of these, reducing the three laterals to about three buds; these become the main arms of the future tree. The one which has been pinched back in the nursery already has the main arms or leaders formed, and these should also be cut back to three or four buds. From these the following year may appear several strong leaders; at the next winter pruning the strongest and best-placed of these are cut back to about 12 in. or 15 in. Those not required for main arms can be entirely dispensed with. By this time one should have a tree with a good foundation, the summer following this should show a strong-growing, densely-foliaged tree, which will require a light thinning out of the centre—this should be done during January. Up to this time no provision has been made for fruit, but this can be done at the next winter pruning, which is the third from time of planting. At this period (winter pruning) one must use good judgment, as there are several strong growths, all of which would make good leaders. Decide which of these are best placed and will make the best leaders, then cut them back to from 12 in. to 30 in. according to growth; the remainder of the strong shoots can be entirely dispensed with, retaining the shorter and weaker ones which are termed laterals. Some growers are in the habit of shortening these back; the writer does not favour this; for after a lengthy experience in growing peaches for profit, I find that it is better to leave these laterals the full length. I have experimented on several different systems for a number of years, and now only practise one, which I find to be simple and most profitable, and will also keep the tree growing in a vigorous condition. But one must not shorten laterals, for if this is done the best fruit buds are cut away and invariably the buds left are weak, and the blossoms often drop off, and what promised to be a good crop diminishes to a small one. The system advocated for treating the laterals after the tree is well shaped and old and strong enough to bear fruit is to retain all the short, well-matured ones, and cut away the stronger ones, of course always making provision for the leaders. Those that are retained will bear fruit the following summer; after fruiting they will become barren for all time, the terminal bud growing for a few inches, sometimes a foot or more. After the laterals have fruited they must be cut hard back at the base; others have appeared from the place or thereabouts where the stronger ones were cut back the previous winter. The majority of this new wood is left to carry the following season's crop. Where you cut away that which has fruited provision is made for a further supply of new wood for another crop the following year. Always dispense with the wood that has fruited; never leave two-year-old laterals in the tree. Let the one-year-old laterals fruit; while these are fruiting others are growing to replace those that have been cut away, and in turn these are disposed of and others again take their place. Given this treatment, the peach will bear heavy crops every year, not only on the top of the tree, but at the bottom also. The leaders should always be cut hard back, say six to eight buds, so as to give them strength; also have them well and evenly spaced. Sometimes they require to be cut back to an inner bud, so as to prevent them being too low or too horizontal, and getting in the way of the plough and cultivator. Occasionally it is a wise plan to cut strong growing laterals about half way back so that more laterals will shoot out.

RENOVATING OLD TREES.

There are many very old peach trees in orchards that are bearing very small crops. In most cases such trees are in good heart and only require skilful treatment to bring about a return of good crops. The writer has pruned many such trees during last winter, and in visiting them again lately found that they, as was expected, have responded splendidly to the treatment given. They are full of new wood, which augurs well for next season's crop, to the great delight of the various owners. There are two ways of bringing an old tree back to a young state again. One is to cut them down to within a few feet of the ground, and depend upon the dormant

buds breaking out and sending forth new growth, and building a new tree up. This method I do not advocate, for unless the roots be very healthy the stump will often die. The second method is to saw any branches that are growing in the centre of the tree away, also those that are too low down, and those that are most exhausted, also dead wood. Do not be afraid of cutting too many limbs out, and do not leave any short stumps, as they invariably die back; cut all limbs close back and trim the edges off with a sharp knife, and paint over. After disposing of these limbs, shorten the remainder back a foot or two. The summer following on this pruning there will be furnished over the whole of the tree a supply of new wood, which may surprise the pruner. During the next winter pruning some of this new growth may be wanted to take the place of some of the old leaders; if so, choose those best suited for the purpose. Of the other young growth, half of it should be dispensed with, retaining the remainder to carry a crop the following summer; this in turn is cut away during the next winter pruning, again leaving more new laterals to carry another crop. Repeat this treatment of new wood each year. In addition to cutting away some of the larger limbs smaller ones can be removed the following year. After about two or three years of this treatment you will have practically a new tree in place of the old one.

THE BANANA BEETLE BORER.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the following report by Mr. Froggatt, the Entomologist who is especially engaged in investigating the Banana Beetle disease.

With all insect pests that have not had sufficient notice taken of them in their initial stages, and which the apathy of those vitally concerned has allowed to increase until they become a decided menace, there is no simple means for a cure. It is only by steady and persistent work in gradually reducing the numbers of the pest that it can first of all be checked, and then by further efforts, consistently sustained, that it can be reduced to a negligible quantity if not completely overcome.

The Banana Beetle Borer, a case in point, differs so markedly in its habits from the general run of orchard pests that the common means of control, such as spraying, &c., are absolutely of no avail. Throughout the whole life-cycle, the insect does not come on to the surface, and the adult beetle does not leave the plant until it is mature.

Under ordinary conditions, there are no openings into the heart of the corm through which the grubs can be reached, and even where beetles have eaten their way out, the old tunnels are so closely packed with the sawdust-like excreta, that the result is virtually the same.

Methods for attacking it are, therefore, limited for the present at any rate, to the adult stage. As the beetles are scattered in the soil, principally in and around the stools and amongst rubbish in between the rows, means of gathering them together as far as possible in one spot in order that they may be more readily collected and destroyed have first to be considered. The most satisfactory method so far found is to lay pieces of clean corm or the base of stems cut surface downwards on the bare ground in or just outside infested stools, or where infested corms or stems are found lying on the ground. The beetles collect on the under-surface of these baits, and by turning them over early in the morning the beetles can be collected and destroyed either by burning, crushing, or other suitable means to hand.

And then arises the greater question, how to reduce the numbers breeding? This is wholly a question of keeping the plantation free from superfluous banana plant material in such a state that the grubs can reach full development therein. Infested plants and bulbs must be dug out and the corms cut into small pieces and the stems cut in halves lengthways; any old corms or stems lying on the ground should be treated in a similar manner. It is preferable to burn this material wherever possible.

It is of little, if any, value to carry out these measures for a time, and then cease from labour thinking the pest is wiped out. Many, acting under this misapprehension, have found to their cost that the beetle borer is an enemy which must not be underrated. Those who realise this fact, and are ready to work against this menace along the lines indicated, will soon reap the beneficial results of their labours.

By further experimentation the work entailed in combating this insect may be greatly simplified, but the tests are not yet sufficiently far advanced to enable conclusions to be drawn from them.

CANE PEST COMBAT AND CONTROL.

The Entomologist to the Bureau of Sugar Experiment Stations, at Meringa, Mr. E. Jarvis, reports under date, 13th December, 1922, as follows:—

Effect of Dry Weather on Cane-Beetles.

In my October report it was mentioned that excavations made in canefields at Highleigh and Meringa had revealed the presence of grey-back beetles in the pupal chambers. It may be stated that the date of these investigations, which was inadvertently given as 10th September, should be corrected to read 10th October.

Upon looking up weather statistics, in relation to rainfall, it appears that the present drought conditions are very similar to those experienced in this district during 1915, when the precipitation for the months of August to November was only 1.74 inches.

Beetles during that year assumed the adult form about the middle of September, and, in spite of abnormal dryness of the soil, were subsequently found alive in their pupal chambers at the end of October.

A month later, however (28th November, 1915), plenty of dead grey-backs were ploughed up on volcanic soil, no living ones being observed. The depth of cultivation on this occasion was 1 ft., in ground fairly loose and very dry.

It appears, therefore, that in certain soils adults of this species are unable to remain alive underground in dry weather longer than from nine to ten weeks. From June to August, while grubs of these beetles were pupating, 5.30 in. of rain were registered, as against 7.19 in. for the same months during 1922. It is interesting to find that since the beginning of September last to date (28th November), we have recorded only 1.79 in. at Meringa (5 points more than fell during the same period in 1915).

In the event of the present dry conditions continuing for another week or so, multitudes of grey-backs that assumed the imago state about seven weeks ago are likely to die in the soil; while others, arising from grubs that pupated later in the year, will be so weakened by protracted confinement underground that if able finally to emerge from the soil next month (December) they may succumb prematurely before able to lay eggs.

In 1915, for instance, beetles that managed to reach the surface when the drought broke in December could not withstand a slight heat wave lasting a couple of days—when the maximum shade temperature ranged from 95 deg. to 98 deg. F.—but simply fell dead in thousands from the feeding-trees. No less than ninety-eight specimens were picked up on an area of about 2 square chains, and twenty-five from under a single gum-tree of moderate size.

The occurrence of such heavy mortality was of exceptional economic interest from the fact of its having happened about seven days after emergence of these beetles, and consequently before they had had time to oviposit. Several were dissected, and the ovaries in all examined were not fully developed, while in some specimens the eggs were half grown.

Breeding Tachinid Fly-Parasites.

During the past month we have built an additional large insect-cage for breeding specimens of *Ceromasia sphenophori*, the tachinid parasite of our beetle borer of cane. This new cage (see accompanying photo.) has a floor area of 56 square feet, and is 7 feet 6 inches high (internal measurements). It is constructed of hardwood, the sides being of mosquito-netting and the roof and hood of strong calico.

Provision has been made for the establishment of conditions resembling as nearly as possible those obtaining in the field, for excluding insect enemies of the fly, and combating entomogenous fungi. Further liberation of parasites has been made this month at Gordonvale, Mount Sophia, and Aloomba.

At the present time, being near the end of the cutting season, it is not easy to procure bored sticks from which to obtain grubs for carrying on our breeding of this useful insect. Growers having any standover cane affected by borer-grubs, and who may be willing to help us in this work, are asked to communicate with the writer. Tachinid flies will be liberated free of charge on plantations seriously affected by the beetle borer (*Rhabdoenemis obscurus*, Boisd.) on condition that the owner will agree to leave at least half an acre of badly-bored, unburnt cane for the parasites to breed in.

Scarcity of Grubs.

The 1922-23 season will see the appearance during next month (December) of vast numbers of a small brown cane-beetle (*Lepidiota frenchi* Blackb.) which fortunately has a two years' life-cycle, and, although emerging each season, occurs in greatest numbers every second year. The third-stage larvæ of *frenchi* are generally destructive to cane from August to November—at a time when grey-back beetles are either underground in the pupal or imago forms, or have oviposited and produced first-stage grubs, which, however, have not commenced to seriously injure the roots.

Both these beetles lay their eggs during December or January, the grubs of *albohirtum* attaining full size in a period of about six months, whereas those of *frenchi*, which mature very slowly, remain in the larval conditions fully a year longer; thus accounting for occurrence in the same furrow, so often noticed by growers, of large and comparatively small grubs. Fully-grown grubs of the latter insect are



PLATE 1.—INTERNAL VIEW OF CORNER OF CAGE FOR BREEDING TACHINID FLIES.

Showing growing cane sticks stocked with Borer grubs ready for the flies to parasitise. Note the holes in middle of internodes, made when inserting the grubs, and plugged with fibre obtained from cocoons of the beetle-borer. Each stick contains 10 to 15 grubs, and is able, under favourable conditions, to produce about 50 tachinid parasites.

usually mistaken for those of *albohirtum*, which they closely resemble in size and general appearance. As mentioned in a previous report ("Australian Sugar Journal," Vol. VIII., p. 917) *frenchi*, although feeding habitually on roots of cereals and various herbaceous plants, has acquired a decided liking for cane. Although one of our serious cane-beetles, being second perhaps to *albohirtum* in economic importance, this insect oviposits as a rule in uncultivated soil densely covered by grass, weeds, &c. This being the case, it behoves growers, as I have advised in a previous report, to maintain during December and January a system of clean culture on areas devoted to cane, and more particularly on fallow land that may be reserved for the planting of an early crop. Both *Lepidoderma albohirtum* and *Lepidiota frenchi*, which usually lay their eggs during these months, are strongly attracted by a luxuriant growth of vegetation between the rows, so that land left in this condition runs a risk of becoming badly infested.

At the present time, cane-grubs are not easy to procure, owing to the prolonged spell of dry weather, so that experimentation against this stage of our grey-back cockchafer has been discontinued for the time being. Very few insects affecting cane have appeared so far, although odd specimens of three or four species of cane-beetles are to be noticed occasionally on the wing during nightfall.

Large Moth-Borer of Sugar-Cane.

This moth pest (*Phragmatiphila truncata*, Walk.) is usually in evidence throughout November and December, at which time of year it attacks principally shoots of young ratoon and plant cane from 9 to 24 inches in height. Attempts to procure additional specimens of its parasite (*Apanteles nonagriæ*, Oliff.), the economic value of which was alluded to in last month's report, have not yet proved successful; but, as it is usually the later broods of *truncata* that are most freely parasitised, we shall probably breed these tiny wasp-parasites from borer caterpillars collected during December. On the 6th instant, fifty-eight ratoons with 'dead hearts' were collected by Mr. H. Knust, at Banda, which when examined yielded forty caterpillars of this moth-borer, the tunnels of the remaining eighteen shoots being empty. These larvæ pupated in due course, and moths commenced to emerge in the breeding-cages about the 18th instant.

Notes on Para-Dichlorobenzene.

We are hoping that the price of this fumigant in England or America may prove to be less than that quoted from Germany.

During field experiments, however, it will be possible to test various methods of application in order to determine the minimum amount of *P. dichlorobenzene* needed per acre to destroy from 80 to 100 per cent. of the grubs. Doses of one drachm placed a foot apart should prove effective if injected in time to catch the first stage larvæ; and this would cost about £4 per acre. By placing these doses 18 inches apart the expense could be still further reduced.

In the event of our being able to purchase the fumigant for 9d. per lb. we reduce the above figures by one-half, and could then well afford to give one-drachm injections a foot apart at a cost of £2.

THE QUEENSLAND COTTON INDUSTRY.

REVIEW AND PROPHECY.

Subjoined are summaries of important interviews accorded to an influential Southern paper on the subject of Queensland's cotton industry by His Excellency the Governor (the Right Hon. Sir Matthew Nathan) and the Premier (Hon. E. G. Theodore) and which are of especial interest to cotton-growers.

Cotton-growing as a Queensland Industry.

His Excellency Sir Matthew Nathan in the course of a Press interview expressed a thorough belief in cotton-growing as a Queensland industry, and remarked—

"It seems that the conditions of the soil and climate are such that we can grow here the best sort of cotton. Under existing conditions in Australia, it is only with such an article that we can count on permanently competing with other producing areas. There will always be a market for the produce of the highest quality, even though much more has to be paid for it than for a lower quality. I should view with little satisfaction any great extension of cotton-growing in Queensland if an inferior article were produced, even if it were to be for home consumption, as this would be

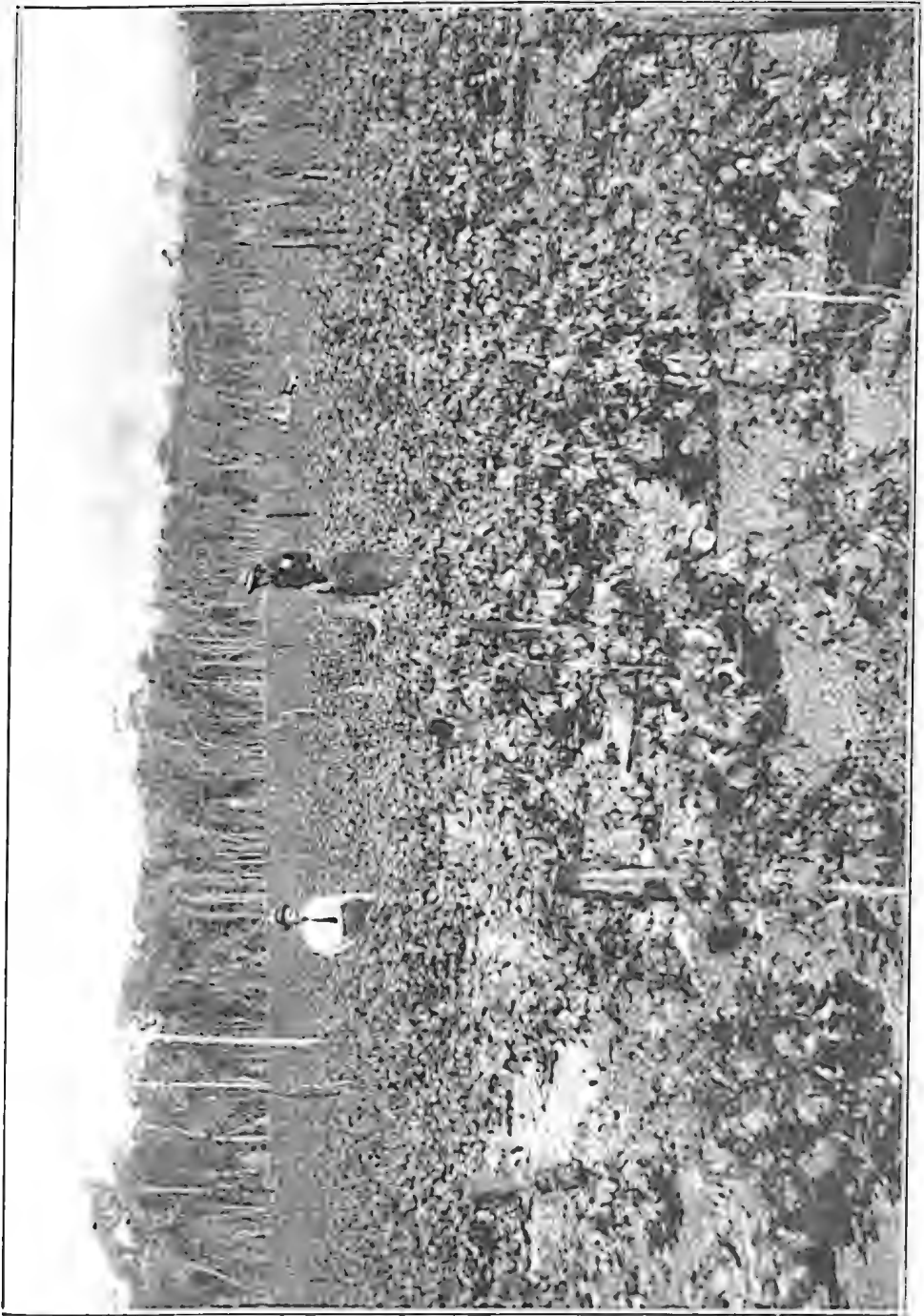


PLATE 2.—COTTON PLANTATION ON VIRGIN LAND, DAWSON VALLEY, CENTRAL QUEENSLAND.

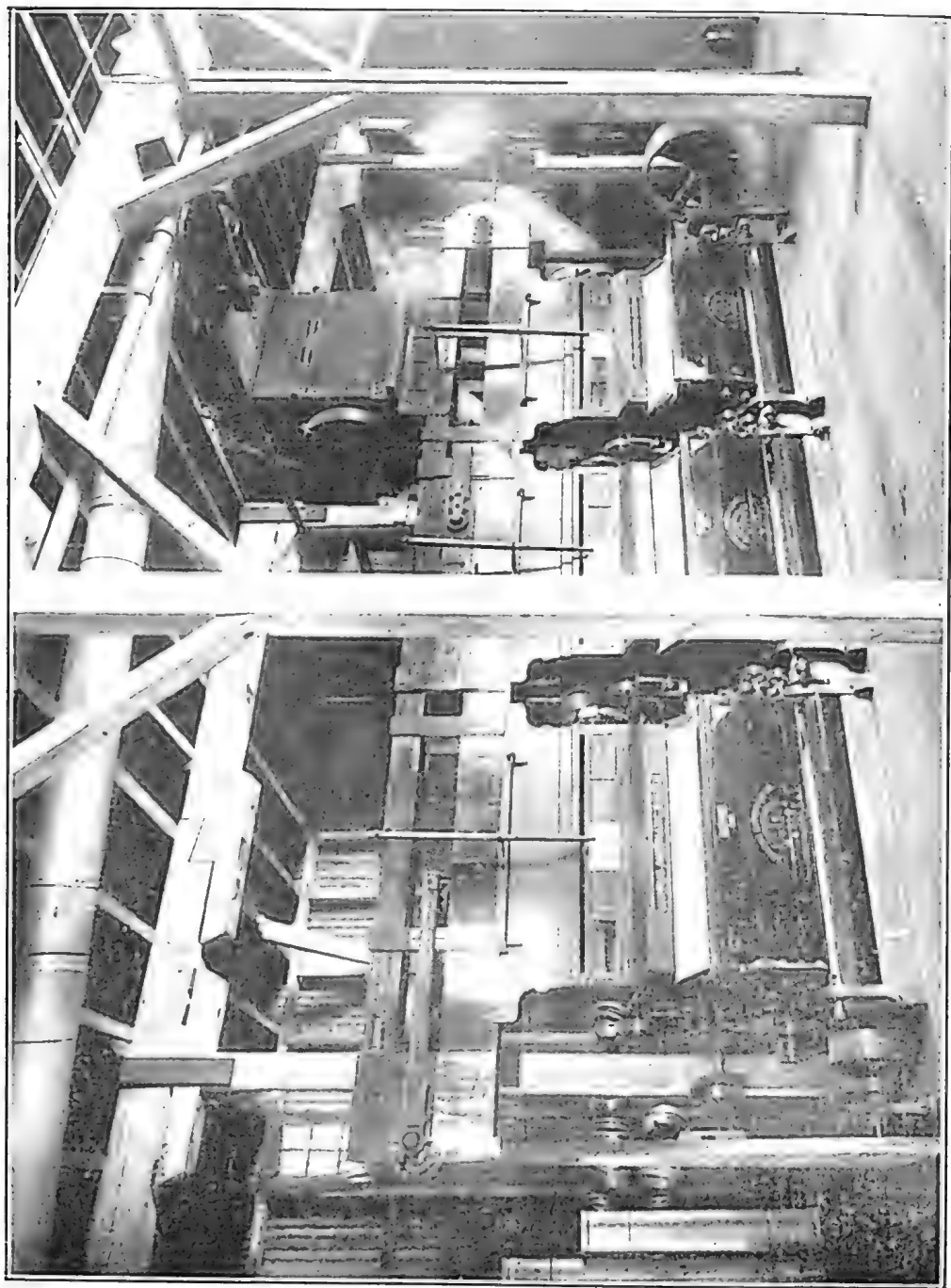


PLATE 3.—COTTON GINNERY (INTERIOR), ROCKHAMPTON.

bound to lead to a deterioration in the cotton for export, and so to the loss of any remunerative export trade. To produce the best cotton it will, of course, be necessary to have, in addition to our favourable natural conditions, the best seed, planted in the best way, and the best cultivation."

Sound Farming Practice Necessary.

"Ultimate success depends on the farmers and they will have to realise that it is much wiser to cultivate a small area well than a larger one indifferently. Some of the cotton lands I saw last May were badly cultivated, owing, as I was told, to the farmers' haste to realise a big return in the season. In this direction lies disease, which may well spread from the ill-cultivated to the well-cultivated cotton farm at Wowan, as it has gone from the neglected to the cared-for orchard at Stanthorpe. I do not imagine, however, that the best cultivation is an absolute specific against disease in these lands so favourable to all forms of life, noxious as well as beneficent."



PLATE 4.—COTTON PICKING, DAWSON VALLEY, CENTRAL QUEENSLAND.

An Element of Mixed Farming.

"The possibility of disease is one of the reasons why I do not believe in the entire dependence of any farmer on cotton. Another is the possibility of fall in price. There will not always be a guarantee, and though I believe, as I have said, that there will be a permanent paying market for the best cotton, it will be necessary for farmers to have some other standby.

"Some farmers came to grow cotton in corresponding circumstances of temporary depreciation in dairying. Wowan dairy-farmers would have gone under if cotton had not saved them. I can quite conceive dairy produce doing a similar service to cotton-growers in the future.

"For these reasons I believe in cotton-growing as an element of mixed farming in combination with dairying, sheepraising, possible wheatgrowing, rather than in exclusive plantations."

The Picking Problem.

"Another reason for small plot cultivation is the labour required for picking. I am doubtful if it would be to the advantage of the State that another great industry in it should become dependent on a large body of seasonal labour, which would have to be paid in inverse proportion to the shortness of the period for which it would be required. Indeed, it seems possible that payment with this consideration in view might make the industry impossible. But the employment of seasonal labour cannot be avoided in the cultivation of larger areas than can be picked by the farmer himself, and those permanently associated with him on the farm. These areas can easily be calculated on the basis of the labour available for the period of picking, of the estimated aggregate picking capacity of the individuals composing it, of the estimated production per acre, and of the time during which picking can be carried on.

"I think it may be taken that a single adult can pick about 5 acres in the season, and that from such an area he should clear, under the present guarantee, about £100 a year. Taking families and the comparatively few cases of labour permanently employed on the farm into consideration, we may hope to see a great number of farms from 5 to 30 acres in area. I have heard that 75 per cent. of the cotton catered for by the Rockhampton ginnery will come this year from farms where outside labour will not be employed for picking. I shall be glad if this percentage is general through the country, and increases.

"I believe that a very large number of farmers growing, as part of their scheme of mixed farming, cotton of the best quality, cultivated in the best manner on such areas as can be picked without the engagement of temporary labour will bring great wealth to Queensland and some of the population it so urgently requires."

The Commonwealth Cotton State.

Points from Hon. E. G. Theodore's remarks in the same journal—

Queensland, with its vast area of fertile land, equable climate, decentralisation of population, extensive and rapidly-extending transport systems and other outstanding advantages, both natural and developed, must become inevitably one of the greatest producing States of the Imperial Group. In building up that prosperity, cotton-growing opens out a vista going far beyond sight.

Unrivalled natural wealth yet latent will place Queensland in a premier position as the Commonwealth Cotton State. Already on much cheaper lands we have grown staples equal to those of any other cotton country in the world. These lands are generally high-class agricultural and fruitgrowing areas, but uncertainty of remunerative markets for ordinary produce has hitherto kept them out of use; for cotton, however, the market is practically unlimited.

Last year in Queensland 1,800 farmers aggregated a side-line crop of cotton worth £90,000 off about 7,000 acres. This year seed has been distributed to 10,361 settlers to sow 129,211 acres. Next year, we expect to have 250,000 acres under crop, but there is nothing to prevent the area being increased until, within a few years, it reaches 5,000,000 acres. There is that area of Crown lands suitable in every way for cotton and served by existing railways and ports, and which can be made available by the Government if it is demonstrated that the crop is payable and permanent.

Successful settlement on cotton areas will be the most effective means of filling Queensland's vacant spaces. For every 1,000 settlers there are work and subsistence for 10,000 men, women, and children; so if our anticipations are realised there may be eventually a population of 1,000,000 people dependent upon this great prospective industry alone.

That is the very best kind of immigration scheme that can be devised. With land available on which the new settler can be assured of a marketable and profitable crop there will naturally follow such an influx of people to Queensland that artificial schemes will be superfluous.

The cotton industry does not involve drudgery on farmers and their families. It is a pleasant, desirable, healthy occupation, and will lead to making agriculture more popular as well as profitable.

Provided suitable seed is sown and kept pure, no reason can be advanced against Queensland cotton prospects that would not apply with equal force to other cotton-producing countries.

Any intention to grow cotton must be backed by an intention to grow the best.

Quality of product must be sustained at a high level and the Queensland Government is doing everything possible to produce and supply to growers high-grade seed of suitable types. This side of the cotton business calls for sound organisation, high intelligence, and the keen co-operation of growers.

Intensive rather than extensive cultivation is desirable, but where conditions fit, larger fields will surely prove an economical proposition.

Continuity of seed selection will standardise crops, and continuity of quality will stabilise values.

Under existing conditions cotton-growing is more suitable as a sideline in diversified farming than as a sole source of income.

Among the essentials of success are right choice and preparation of soil, seed selection, careful cultivation and restriction of areas to an acreage that can be conveniently and profitably worked.

The Queensland cotton industry will also benefit by the State-wide system of rural organisation now proceeding vigorously along well-defined, scientific lines. The days of amiable aspiration and pious platitude in relation to the agricultural industry in Queensland are gone. Farmers have asked for facilities to exercise their right to the recognition of their calling as a business enterprise, and claim the same consideration extended to other branches of commerce, and the Government is standing by them.

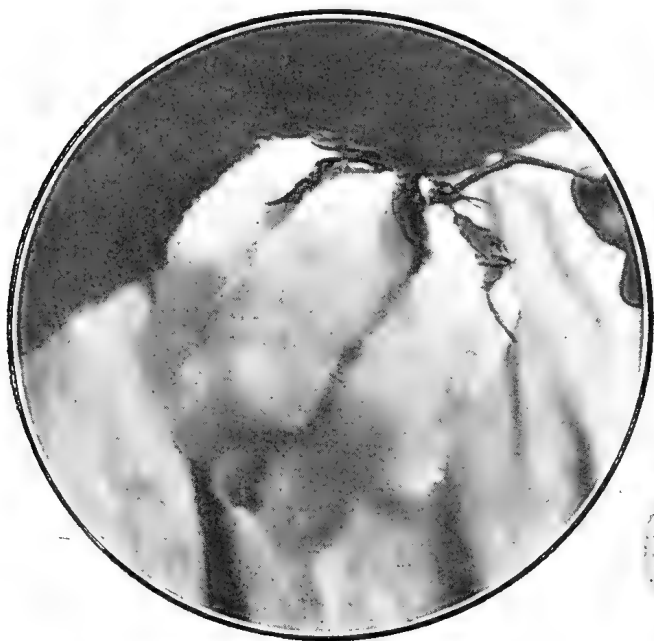


PLATE 5.—A FLEECY FLAKE FROM COTTON LAND.



Photo. by R. Harding.]

PLATE 6.—IN QUEENSLAND COTTON COUNTRY—Members of the British Cotton Delegation at Gordon Downs, Capella District, C.Q.



Photo. by R. Harding.]

PLATE 7.—ALLUVIAL FLATS ON BELL'S CREEK, CALLIDE VALLEY—Inspection by the British Cotton Delegation.



Photo. by R. Harding.]

PLATE 8.—THE COTTON DELEGATION AT STAFF-SURVEYOR SUTER'S CAMP,
BELL'S CREEK, CALLIDE VALLEY.

*Left to Right: Mr. Crompton Wood, Mr. Crawford Vaughan, Mr. R. Harding,
Mrs. Suter, Mr. Harold Parker.*



Photo. by R. Harding.]

PLATE 9.—LENDING A HAND, WOWAN, DAWSON VALLEY.



Photo, by R. Harding.]

PLATE 10.—ON THE ROAD FROM KINGARROY TO BELL—SCRUB SCENE NEAR PORTER'S GAP, BUNYA MOUNTAINS.



Photo, by R. Harding.]

PLATE 11.—THE DELEGATION AT WORK, CALLIDE VALLEY.



Photo. by R. Harding..

PLATE 12.—IN TRACKLESS LANDS. SCENE ON UPPER CALLIDE.



Photo. by R. Harding.]

PLATE 13.—A DON RIVER CROSSING, DAWSON VALLEY.



Photo. by R. Harding.]

PLATE 14.—AN EASY CROSSING. VIRGIN CALLIDE COUNTRY.



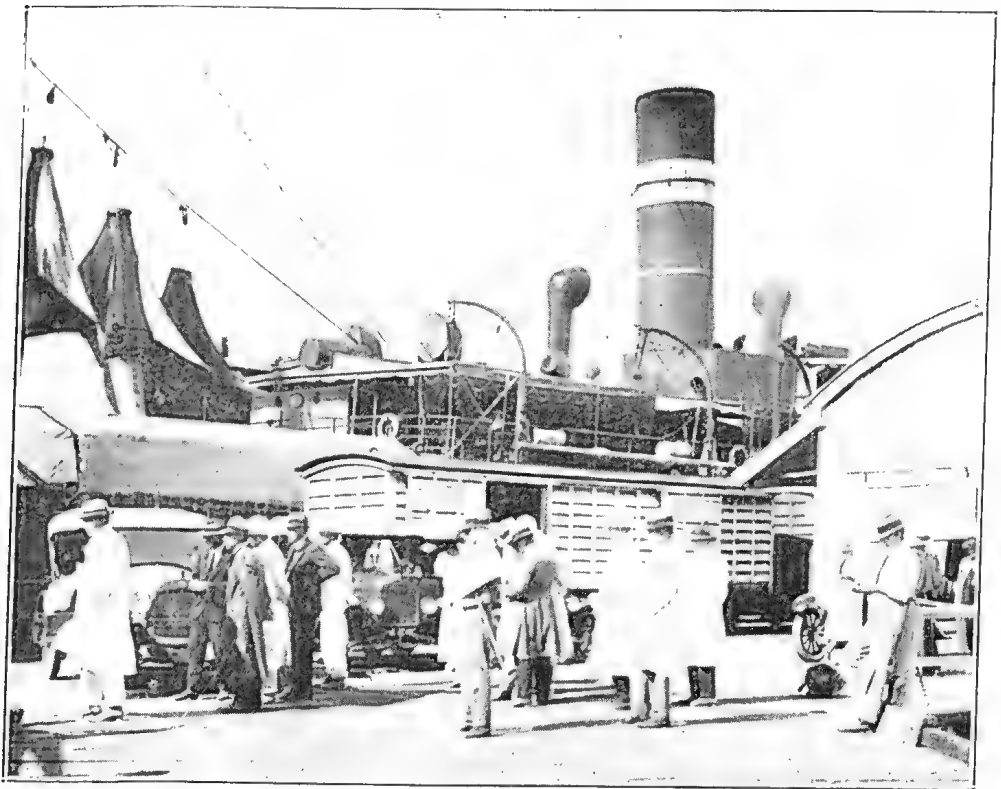
Photo. by R. Harding.]

PLATE 15.—A GLIMPSE OF THE CALLIDE VALLEY FIATS—KING COTTON'S UNFURROWED REALM.



Photo, by R. Harding.]

PLATE 16.—A SANDY PATCH EN ROUTE FROM BELL'S CREEK TO THE CALLIDE.



Photo, by R. Harding.]

PLATE 17.—COTTON DELEGATION INSPECTING SHIPPING FACILITIES, GLADSTONE JETTY.



Photo. by R. Harding.]

PLATE 18.—A PIONEER'S CLEARING NEAR PORTER'S GAP, BUNYA MOUNTAINS.



PLATE 19.—EXTENDING KING COTTON'S REALM—A PRELIMINARY SKIRMISH.

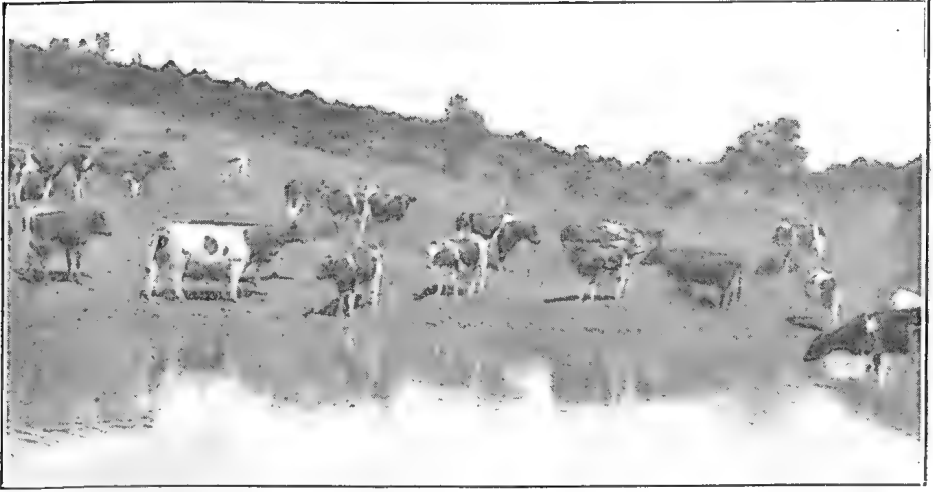


PLATE 20—A TINGOORA HERD OF FRIESIANS. Scene on Ryfield, Mr. P. P. Fall's Farm.



Photo. by R. Harding.]

PLATE 21.—ON GUM AND APPLE PASTURES. A Homestead Outlook,
"Marshlands," Wondai.

BANANA BUNCHY TOP DISEASE.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available a report of investigations of the Bunchy Top disease of bananas made conjointly by Dr Darnell Smith (Vegetable Pathologist of the New South Wales Department of Agriculture) and Mr. Henry Tryon (Vegetable Pathologist and Government Entomologist, Queensland). The disease has spread across the border into the south-eastern corner of this State and is causing much loss to growers and concern to departmental officers. Both officers visited the affected border areas and studied the malady from every angle and noted local remedial measures and experiments. Notwithstanding close observations and the knowledge of affecting facts no definite exclusive cause of the disease was discovered. Further, they concluded that the explanations with reference to its origination in the individual plant, put forward without—as far as could be ascertained—positive experimental evidence of a conclusive nature had not advanced their knowledge of the subject. However, the New South Wales investigations and especially its field experiments directed to definite phases of the question, would, as far as they had proceeded, appear to have narrowed the inquiry materially; suggesting, as they did, that certain theories put forward to explain the incidence and mode of action of banana bunchy top had now to be dismissed as untenable.—Ed..

Theories relating to the following possible agencies in promoting plant sickness were investigated:—

1. Soil Depletion, by the Loss—to Some Extent Absence—of Essential Banana-Plant Food Constituents in it.

Fertiliser field experiments have rendered it evident that the use of complete fertilisers of varying constitution, as well as fertilisers providing a single essential plant food requirement, do not prevent the occurrence of the disease, either in soils relatively rich or in ones relatively poor, as ordinarily understood.

[NOTE.—These experiments, which have been conducted on proper lines, have, however, not so far related to humus-producing fertilisers nor covered the entire range of soil-types.]

2. Loss of Vigour in Banana Plants—e.g., by the Continuous Use of Banana Plants of a Single Origin.

Although the general habit of the plants in which the disease may manifest itself, including such plants as receive fertilisers as a field routine procedure, and although the high quality of the banana fruit that the district generally yields, would appear to be conclusive as to the “strain” of plants generally grown not having developed weakness, and so disease, this factor—hypothetical impairment of stamina—has not been lost sight of. It has now been shown experimentally to be non-operative by the manifestation of the Bunchy Top disease in plants introduced into the affected area from remote districts in which there has been no history of the occurrence of the malady, equally with those of local origin. One of these experiments, in which banana corms were obtained from north of Cairns, Queensland, covered no less than ten distinct field plots in the Tweed District.

3. Soil Acidity.

The factor of soil acidity, which might be presumed to operate in promoting the occurrence of disease, has been the object of test experiments with so far negative results. Ant-acids applied to the soil, whether in the form of lime or basic phosphates, having failed to protect plants from the disease occurrence—even ones introduced from “clean areas.”

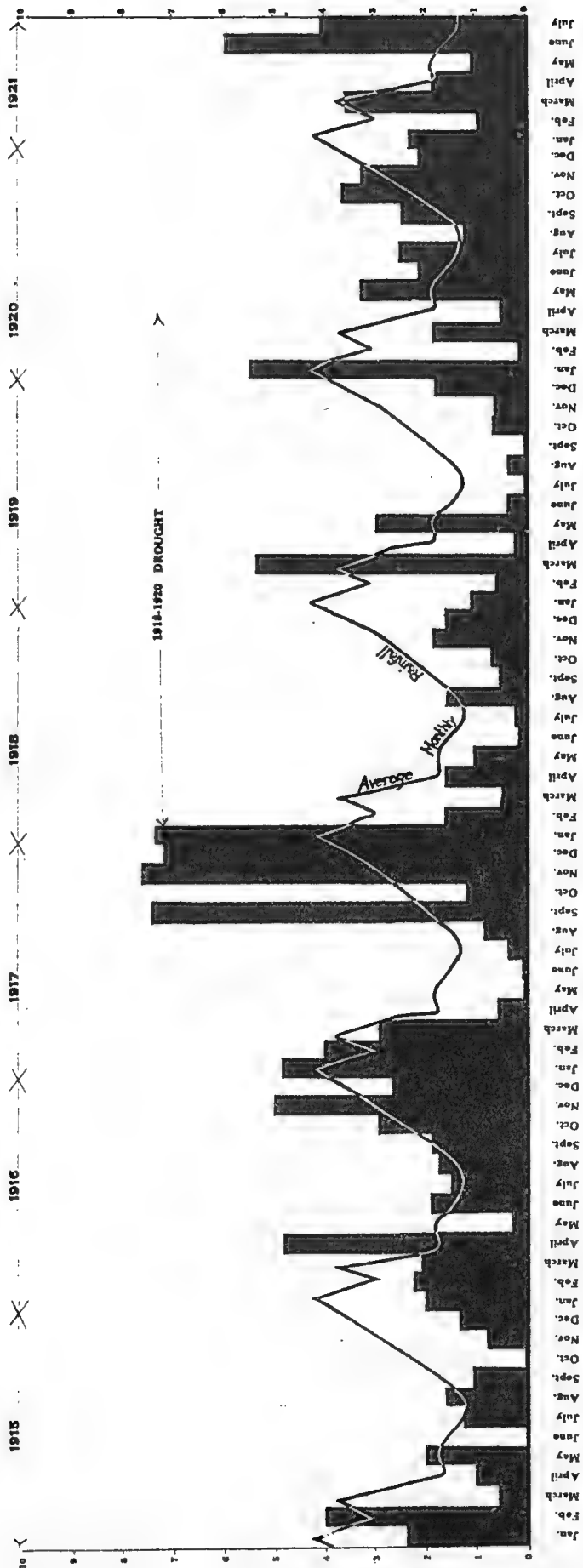
4. Soil Contagion.

Field experiments have again shown that the disinfection—by one or other fungicides—of suckers in planting, and simultaneously that of the soil with which they are brought in contact, does not prevent the occurrence of the disease in plants derived from such suckers.

5. Definite Parasite Action.

Again, investigations have so far failed to reveal the presence of a fungus-organism or of fungus-organisms capable of originating Bunchy Top under experimental conditions, although certain ones, included in groups in which undoubted plant parasites occur, have been met with by one of us. (The inquiry, however, is still in progress.)

RAINFALL CHART.
QUEENSLAND AGRICULTURAL COLLEGE



6. Animal Parasites.

A nematode causing plant injury that we have commonly found in connection with the roots of Bunchy Top affected plants, not being invariably found to occur in this association, cannot be the exclusive cause of the malady. That any insect is incriminated has not been shown definitely to be the case.

[NOTE.—Some notoriety has attached to the pronouncement that a particular insect—the Banana Aphis (*Pentalonia nervosa*)—serves as the communicator of the disease between one plant and another, or even is its prime cause in healthy plants, and although general observations do not favour the explanation a remedy involving this insect theory is being tested in the New South Wales portion of the infected area.]

7. Climatic Factors.

The prejudicial effects of meteorological conditions unfavourable to the growth of the banana plant, those only gradually manifested in the course of years, cannot be settled by direct experiment. It appears, however, to be interdicted by what is known regarding the geographical range of the Cavendish and of other banana varieties, not only in the Tweed area but elsewhere. In regard to the former, there is evidence that in the past an abundant yield of good fruit has been raised from healthy plants for eight or ten successive years.

8. Climatically Injured Soil Conditions.

No evidence as to the nature of the change spontaneously produced in the soil under banana crops, since its adaptation from its original condition as a scrub or forest soil to this cultural use was obtained. This is a matter amongst others that it is proposed to be inquired into.

9. Prevention and Cure.

Both these are dependent on a knowledge of the cause of Bunchy Top disease or must have relation therewith. Not knowing the cause they cannot be predicted, and moreover we have not sought to discover them by empirical procedures conducted in this respect in the dark.

10. Further Research.

Further scientific inquiry on the cause, prevention, and cure of Bunchy Top disease is still called for. This inquiry should embrace both field and laboratory experiments and research. The bestowal of the fullest measure of scientific thought and endeavour in respect to the disease is urgently necessary.

ORANGE SUCKING BUGS.

By A. H. BENSON, M.R.A.C.

Two kinds of sucking bugs—viz., the Bronze Orange Bug (*Oncoscelis Sulci-ventris*) and the green or Spiny Orange Bug (*Biporus bibax*)—both of which are native insects confined to Queensland and the northern coast districts of New South Wales, have been well known to orchardists for many years on account of their abominable odour and the damage they cause to citrus orchards, both to the fruit and the young tender shoots.

For a long time these insects were not looked upon as a very serious menace, as they were seldom met with in very large numbers, being evidently kept in check by natural agencies; but during the past three or four years their numbers have increased enormously, until during the present season a gallon or more bugs have been taken from a single tree in one day, and serious loss has been experienced by growers owing to the large quantity of fruit that has been destroyed, to say nothing of the young growth that has been killed.

In order to determine the best method of dealing with these pests it is necessary to possess a thorough knowledge of their life-history and habits. Fortunately these are and have been well known for many years, but unfortunately this knowledge has not been taken advantage of as it should have been. As already stated, both of these sucking bugs are native insects which, prior to the introduction of cultivated varieties of citrus fruit, fed on our native species of citrus—which were common in our coastal scrubs, but are now much less numerous—as well as on other native plants belonging to the same natural order "*Rutaceæ*."

These native citrus and other plants belonging to the same natural order still provide a breeding ground from which the fully developed bugs can fly to cultivated orchards, and it is possible that they may have been the source from which a large number of the fully developed bugs that have been met with recently in the orchards have been derived. From the information submitted by growers, there has apparently been a regular influx of mature bugs from an outside source in the case of orchards where the bugs have been regularly and systematically gathered and destroyed, and which could not therefore have been bred in the orchard.

Life History.—

The life history of the bug is briefly as follows:—

The mature female bug deposits her eggs in clusters of about ten or a dozen on the leaves of citrus trees or other host plants. These eggs are about the size of a No. 5 shot—white in colour and possessing a pearly lustre. The shell of the egg is hard and not easily acted upon by any spraying material, so that it cannot be destroyed by spraying.

In a few days the young bugs hatch out from the egg clusters, the exact time depending on weather conditions. When they hatch out they remain clustered together for some time, and finally distribute themselves over the tree.

From the time they hatch out from the egg till they become fully mature insects (a period of a month or longer, according to local conditions), the young bugs are unable to fly. They, however, undergo several moults and change their colour first to a yellow, then to a red, and finally to a dark bronze-green in the case of the Bronze Orange Bug, and first to a yellow then to a green, and finally to the dark green of the fully matured Green or Spiny Orange Bug.

As soon as the young bugs leave the cluster in which they remained for a time after they had hatched out, they start in search of food, which they obtain by sucking from the stem or skin of the fruit or from young tender succulent growths, using their rostrum or sucking trunk, with which they easily pierce the skin or soft bark for this purpose.

Methods of Destruction.—

It will thus be seen that there is very little chance of poisoning their food, as, so far, there is no known method of poisoning the sap of a tree so that the insects feeding thereon by suction may be destroyed. Other methods of destruction must therefore be employed, and they consist of the following:—

First.—Get rid of all sources of infection, such as native citrus or other plants harbouring and breeding the bugs, isolated trees of cultivated varieties of citrus fruits that have been allowed to run wild, and all citrus trees in neglected or abandoned orchards.

Second.—Gather and destroy every mature bug, partly developed bug, egg cluster, or cluster of young bugs, early in the season. This work should start in July and be systematically followed up by every grower of citrus trees. If this is done, there will be very little, if any, loss.

Third.—As the young bugs are easily killed by means of oil or caustic sprays, these should be used regularly before the insects become fully developed, when their body is so well protected by the wing covers and hard covering that sprays have little effect on them.

Fourth.—As the bugs, both immature and fully developed insects, are always sluggish at daybreak, they can be easily shaken on to a cloth or sheet placed under the tree, or they will run to the centre of the tree from which, if it has been properly pruned, they can easily be brushed off on to the sheet. Tapping the outside of the tree with a padded stick is better than shaking the tree. The success of this method depends on the work being carried out the first thing at daybreak, for when the sun is well up the mature insects fly as soon as disturbed, and the immature bugs will hang on to the tree and not fall.

Fifth.—Hand gathering the eggs and the bugs, in all stages, whenever seen.

Sixth.—Cyaniding destroys many bugs in all stages, but is too costly to use for this purpose solely.

Seventh.—Deal with the bugs promptly; do not delay action because only a few are to be seen, but stamp them out before they have time to breed.

Prompt Action Necessary.—

Prompt and combined action is the secret of success in dealing with pests of this nature, and the neglect to take such action is largely, if not entirely, the cause of the present infestation, as the large number of bugs did not all breed at once, but are the progeny of many different hatchings.

Pests of this nature and others, such as locusts and caterpillars that destroy grass, grain, or hay crops, can be kept in check if dealt with as soon as they make their appearance, and the damage they cause will be reduced to a minimum by prompt and concerted action, without which no remedies are effectual and serious losses are bound to occur.

The question of dealing effectually with sucking bugs is therefore in the hands of our citrus growers, and now that they are well organised there should be little difficulty in bringing about concerted action for the destruction of this pest or of forcing careless persons who are simply breeding the pest to take the necessary steps for its destruction.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF NOVEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING NOVEMBER 1922 AND 1921 FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Nov.	No. of Years' Records.	Nov., 1922.	Nov., 1921.		Nov.	No. of Years' Records.	Nov., 1922.	Nov., 1921.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
	In.		In.	In.		In.		In.	In.
Atherton	2'05	21	0'29	Nil	Nambour	3'85	26	1'46	3'98
Cairns	4'13	40	0'10	2'80	Nanango	2'57	40	2'25	1'09
Carlwell	4'13	50	1'65	0'42	Rockhampton ...	2'17	35	2'21	1'93
Cooktown	2'76	46	0'60	0'80	Woodford	3'20	35	2'50	3'56
Herberton	2'36	35	1'16	0'10					
Ingham	3'84	30	0'46	0'54	<i>Darling Downs.</i>				
Innisfail	6'35	41	1'93	0'89	Dalby	2'66	52	0'62	1'74
Mossman	4'52	14	0'60	1'12	Emu Vale	2'57	26	3'78	2'06
Townsville	1'84	51	0'21	0'01	Jimbour	2'36	34	0'49	1'79
					Miles	2'49	37	0'29	1'14
<i>Central Coast.</i>					Stanthorpe	2'70	49	3'32	2'24
Ayr	1'75	35	2'82	0'14	Toowoomba	3'26	50	1'81	1'34
Bowen	1'31	51	0'27	Nil	Warwick	2'51	57	4'80	3'36
Charters Towers ...	1'58	40	0'10	Nil					
Mackay	2'91	51	1'56	1'46	<i>Maranoa.</i>				
Proserpine	3'02	19	0'56	0'94	Roma	2'05	48	0'26	1'12
St. Lawrence	2'34	51	0'72	0'53					
<i>South Coast.</i>					<i>State Farms, &c.</i>				
Biggenden	2'70	23	1'77	2'42	Bungeworgorai ...	1'96	8	1'09	1'77
Bundaberg	2'60	39	0'17	1'63	Gatton College ...	2'60	23	2'71	0'48
Brisbane	3'69	71	3'53	3'24	Gindie	2'03	23	2'28	0'05
Childers	2'81	27	1'89	3'24	Hermitage	2'61	16	2'99	2'81
Crohamhurst	4'39	30	3'86	2'76	Kairi	2'14	8	0'29	0'07
Essex	3'13	35	3'27	1'53	Sugar Experiment Station, Mackay	2'62	25	1'74	1'32
Gayndah	2'80	51	2'56	1'38	Warren	3'42	8	2'09	4'30
Gympie	3'16	52	2'46	3'01					
Gla-shouse Mts. ...	3'74	14	1'24	3'48					
Kilkivan	2'58	43	2'22	2'96					
Maryborough	3'11	51	1'55	3'32					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for November this year, and for the same period of 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
State Meteorologist.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, DECEMBER, 1922.

The weather throughout the month was very hot, and gave the competition birds a trying time. The outlying feature of the laying among the light breeds was a fine score of 155 eggs laid by N. A. Singer's pen, his B. bird laying the possible, 31 eggs. C. H. Singer's pen came second with 151 eggs. In the heavy breeds Mr. R. Burns came first with 137 eggs. There were several cases of moult, all among birds which had just left the broody coops. Broodiness has again been troublesome, and accounts for small scores among the heavy breeds. One bird died during the month, the cause of death being apoplexy. The following are the individual scores:—

Competitors.	Breed.	Dec.	Total.
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LIGHT BREEDS.

*N. A. Singer	White Leghorns ...	155	1,230
C. H. Singer	Do.	151	1,188
*W. and G. W. Hindes	Do.	132	1,104
*Bathurst Poultry Farm	Do.	135	1,046
*S. L. Grenier	Do.	133	998
*R. Gill	Do.	126	997
*G. Trapp	Do.	127	994
*W. Becker	Do.	135	984
*J. M. Manson	Do.	127	982
*W. A. Wilson	Do.	124	981
*Mrs. L. Andersen	Do.	116	977
*H. P. Clarke	Do.	127	967
*J. W. Newton	Do.	126	953
*T. Fanning	Do.	92	943
J. H. Jones	Do.	83	938
*G. Williams	Do.	124	926
*C. Goos	Do.	120	920
A. G. C. Wenck	Do.	84	916
*R. C. Cole	Do.	105	913
*Oakleigh Poultry Farm	Do.	105	905
*O. Goos	Do.	106	900
*R. C. J. Turner	Do.	131	896
*Mrs. R. E. Hodge	Do.	111	890
*H. Fraser	Do.	97	875
*F. Birchall	Do.	130	867
*M. F. Newberry	Do.	93	859
*J. W. Short	Do.	115	859
N. J. Nairn	Do.	122	857
*Mrs. E. White	Do.	104	843
B. Hawkins	Do.	98	843
*Thos. Taylor	Do.	108	833
*C. M. Pickering	Do.	92	833
J. Purnell	Do.	82	822
T. H. Craig	Do.	96	813
A. Maslin	Do.	107	806
*E. A. Smith	Do.	118	792
G. F. Richardson	Do.	89	766
B. C. Bartlem	Do.	93	756
E. Stephenson	Do.	72	747
E. Symons	Do.	69	735
H. Trappett	Brown Leghorns ...	100	719
Brampton Poultry Farm	White Leghorns ...	102	705
A. Anders	Do.	70	701
Parisian Poultry Farm	Brown Leghorns ...	58	469

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Dec.	Total.
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	137	1,100
*A. E. Walters	Do.	103	991
*T. Hindley	Do.	90	944
*C. C. Dennis	Do.	103	908
*R. Holmes	Do.	86	894
*E. F. Dennis	Do.	101	870
Mrs. A. Kent	Do.	88	868
Jas. Hutton	Do.	89	862
*H. M. Chaille	Do.	71	861
Mrs. A. E. Gallagher	Do.	100	841
R. Innes	Do.	90	800
*Jas. Potter	Do.	93	790
H. B. Stephens	Do.	88	776
Mrs. L. Maund	Do.	86	775
W. Becker	Chinese Langshans ...	77	749
*Rev. A. McAllister	Black Orpingtons ...	79	737
Wambo Poultry Farm	Do.	79	736
C. Doan	Do.	100	735
V. J. Rye	Do.	85	729
*Parisian Poultry Farm	Do.	83	728
Jas. Hitchcock	Do.	64	706
C. Rosenthal	Do.	91	660
W. C. Trapp	Do.	94	618
R. Burns	Silver-laced Wyandottes	74	589
*J. E. Smith	Plymouth Rocks ...	70	531
Miss L. Hart	Rhode Island Reds ...	54	413
Total ... ..	...	7,068	59,289

* Indicates that the pen is being single tested.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
N A. Singer	181	231	191	212	200	215	1,230
W. and G. W Hindes	187	179	189	179	194	176	1,194
Bathurst Poultry Farm	145	158	188	182	202	171	1,046
S. L. Grenier	161	134	172	173	177	181	998
R. Gill	183	178	186	169	128	153	997
Geo Trapp	176	157	163	180	148	165	994
W. Becker	161	137	174	160	170	182	984
J. M. Manson	167	145	170	151	184	165	982
W. A. Wilson	167	152	139	176	168	179	981
Mrs. L. Andersen	185	138	172	160	164	158	977
H P. Clarke	161	149	166	176	155	160	967
J. W. Newton	170	164	182	144	167	126	953
T. Fanning	123	166	175	159	198	122	943
G. Williams	148	157	175	158	152	136	926
C. Gcos	119	138	148	166	194	155	920
R. C. Cole	179	140	171	124	147	152	913
Oakleigh Poultry Farm	167	142	160	140	142	154	905
O. Goos	153	127	164	172	157	127	900
R. C. J. Turner	162	138	165	155	156	120	896
Mrs. R. Hodge	180	118	149	135	181	127	890
H. Fraser	147	165	148	130	130	155	875

EGG-LAYING COMPETITION—*continued.*DETAILS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS—<i>continued</i>							
F. Birchall	149	166	117	99	177	159	867
M. F. Newberry	147	125	118	177	134	158	859
J. W. Short	149	144	154	129	131	152	859
Mrs. E. White	157	77	172	116	152	169	843
Thos. Taylor	151	120	150	141	140	131	833
C. M. Pickering	167	163	107	136	141	119	833
E. A. Smith	125	126	143	143	125	130	792
HEAVY BREEDS.							
R. Burns	176	182	171	200	182	189	1,100
A. E. Walters	159	146	134	165	201	186	991
T. Hindley	137	156	109	201	204	137	944
C. C. Dennis	150	164	163	132	157	142	908
R. Holmes	118	175	156	145	142	158	894
E. F. Dennis	132	148	174	79	160	177	870
H. M. Chaille	152	152	165	130	159	103	861
J. Potter	135	137	132	139	143	104	790
Rev. A. McAllister	133	141	151	91	65	156	737
Parisian Poultry Farm	88	122	145	91	138	144	723
J. E. Smith	65	108	79	71	92	116	531
Miss L. Hart	80	94	63	87	45	74	438

CUTHBERT POTTS, Principal.

“THE FERTILISERS ACT OF 1914” AND “THE FERTILISERS ACT AMENDMENT ACT OF 1916.”

The attention of storekeepers, manufacturers, or other vendors of fertilisers is directed to the provisions of the Fertilisers Acts and Regulations set out hereunder.

Dealers' Licenses.

No person may sell any fertiliser unless he is licensed as a dealer under the Act. Any person who desires to become licensed as a dealer must apply in writing to the Minister for Agriculture, in the form prescribed by Schedule I., and remit therewith the prescribed fee of one guinea.

The license issued in the form of Schedule II. of the Act remains in force until the thirty-first day of December of the year in which it is issued. It may be renewed annually on payment of the prescribed fee of one guinea.

Certificate of Registration of Fertiliser.

On or before the thirty-first day of January in each year every licensed dealer must deliver to the Under Secretary, Department of Agriculture, Brisbane, a certificate in the form of the Third Schedule of the Act, setting out the specified ingredients of each brand of fertiliser sold by him. A copy of Schedule III. is enclosed.

Upon the sale of any fertiliser, whether paid for at the time or not, the dealer must at the time of sale, or before delivery of the same or any part thereof, give to the buyer an invoice certificate, in the form of Schedule IV., or to like effect, signed by the seller or his agents, and containing the particulars prescribed.

Invoice Certificate.

The invoice certificate should be in the following form:—

SCHEDULE IV.

“The Fertilisers Acts of 1914-1916.”

INVOICE CERTIFICATE.

I [here insert name and address of licensed dealer], in the State of Queensland, licensed dealer under the “Fertilisers Acts of 1914-1916,” hereby certify that the fertiliser this day sold (consigned or forwarded, or as the case may be) by me to [here insert name and address of buyer], being a quantity of tons cwt. lb., is known as [here insert name of fertiliser], and is marked with the figure, or trade mark, or sign following, that is to say [here insert trade mark or sign on bag].

And I also certify that such fertiliser contains the following ingredients, in the proportion of the whole, set opposite thereto, in the form hereunder:—

Nitrogen,	per centum, as	nitrate.*
Nitrogen,	per centum, as	ammonium sulphate.
Nitrogen,	per centum, as	blood.
Nitrogen,	per centum, as	flesh and offal.
Nitrogen,	per centum, as	bone nitrogen.
Nitrogen,	per centum,	unspecified.
Phosphoric Acid,	per centum, as	water soluble phosphoric acid.
Phosphoric Acid,	per centum, as	citrate soluble phosphoric acid.
Phosphoric Acid,	per centum, as	citrate insoluble phosphoric acid.
Phosphoric Acid,	per centum,	total phosphoric acid.
Potash,	per centum, as	potassium sulphate.
Potash,	per centum, as	potassium chloride.
Potash,	per centum,	insoluble and unspecified.
Fine material,	per centum.†	
Coarse material,	per centum.†	

In the case of excrement of animals or any natural substance or natural product which is used for fertilising the soil, or supplying nutriment to plants, other than stable manure, seaweed, or crude nightsoil, the average analysis is as under:—

Nitrogen,	per centum.	Phosphoric acid,	per centum.	Potash,
	per centum.			

In the case of lime for fertilising purposes:—

- (a) Caustic lime, or burnt lime, or quick lime—
Calcium oxide (CaO), per centum.
- (b) Mild lime, or air-slaked lime†—
Hydrate of lime (Ca(OH)_2), per centum.
Lime carbonate (CaCO_3) per centum.
- (c) Agricultural lime†—
Lime carbonate (CaCO_3), per centum.
- (d) Gypsum†—
Lime sulphate (CaSO_4), per centum.
Fine material, per centum.†
Coarse material, per centum.†

In the case of ashes, or wood ashes:—

Potash,	per centum.	Phosphoric acid,	per centum.	Lime
(CaO),	per centum.			
Dated at	, this	day of	, 192 .	

[Signature of dealer or his agent.]

* Here state whether in form of sodium, or potassium, or lime nitrate.

† In the case of bonedust and bonemeals, the percentage of fine and coarse material to be stated—fine to signify the particles smaller than one-fiftieth of an inch, and coarse larger than one-fiftieth of an inch.

In the case of basic slag, or Thomas phosphate, the percentage of fine and coarse material to be stated—fine to signify particles smaller than one-hundredth of an inch, and coarse larger than one-hundredth of an inch.

‡ In the case of air-slaked lime, agricultural lime, and gypsum, the percentage of fine and coarse material to be stated—fine to signify particles smaller than one-fortieth of an inch, and coarse larger than one-fortieth of an inch.

Printed Label to be attached to each Package.

Every dealer who sells (*see* definition of "Sale") any fertiliser must securely affix conspicuously to each package a *plainly printed label* clearly and truly certifying:—

- (a) The number of net pounds of fertiliser in the package;
- (b) The figure, trade mark, or other sign under which the fertiliser is sold;
- (c) The chemical analysis, stating the percentage of nitrogen, phosphoric acid and potash, and the *forms* in which they respectively occur, and the percentage of fine and coarse material, etc., as required by Schedule III. and IV.

In the case of agricultural lime the percentage of coarse material and fine material must be stated on the label, together with the percentage of lime as CaO (calcium oxide) or CaCO_3 (lime carbonate); and in the case of gypsum the percentage of CaSO_4 (lime sulphate).

Sale.

"Sale" (with its derivatives) includes barter; also offering or attempting to sell, or manufacturing for sale, or importing or indenting, or receiving or introducing for sale, or having in possession for sale, or sending, consigning, forwarding, or delivering for sale, or causing or suffering or permitting or allowing to be sold or offered or exposed for sale.

Fertiliser.

A fertiliser is any substance or compound containing, in appreciable quantity, nitrogen, phosphoric acid, potash, or lime, manufactured, produced, or prepared in any manner for fertilising the soil or supplying nutriment to plants; also any excrement of animals or any natural substance, or natural product which is used for fertilising the soil or supplying nutriment to plants. The term does not include farmyard manure, stable manure, seaweed, or crude nightsoil, but any other crude product, or offal, whether specially treated or not, is a fertiliser within the meaning of the Acts if sold for the purposes of fertilising the soil.

Prices "Unit Value."

"Unit Value" means the cost of one per cent. by weight of the fertilising constituent in one ton of fertiliser. The unit values are fixed by the Commissioner of Prices, and give the maximum prices that may be charged by licensed dealers in fertilisers. The prices are based on registered analysis or certified actual analysis, provided that the containers are labelled as to analysis, etc., and the fertilisers invoiced in accordance with the Queensland Fertilisers Acts of 1914-1916.

All licensed dealers should make themselves fully acquainted with the unit values so fixed, and particular attention is directed to Prices Notification No. 386, which appeared in the *Government Gazette* of 7th October, 1922, in which will be found definitions of "fine," "coarse," "unspecified," etc.; also to Prices Notification No. 396 (*Government Gazette* of 4th November, 1922).

Dealers to Note.

It is to be noted that every person who intends to offer for sale, or sell, any fertiliser, must, before doing so—

Obtain a license from the Department of Agriculture;

Send a certificate of registration to the Department for each kind of fertiliser that it is proposed to sell;

Attach a printed label to each package, giving the required particulars; and

On a sale, give the buyer an invoice certificate as required by Schedule IV.

The invoice certificate given to the buyer, and the label attached to each package, must agree with the certificate of registration sent to the Department of Agriculture.

Forms of Registration (Schedule III.) or any other particulars, may be obtained from

THE UNDER SECRETARY,

Department of Agriculture and Stock,

Brisbane.

SHOW DATES FOR 1923.

Stanthorpe: 7th to 9th February.

Warwick: 13th, 14th, and 15th February.

Allora: 20th and 21st February.

Clifton: 28th February and 1st March.

Goombungee: 22nd March.

Herberton: 2nd and 3rd April.

Pittsworth: 4th April.

Chinchilla: 10th and 11th April.

Goondiwindi: 10th and 11th April.

Killarney: 11th and 12th April.

Esk: 11th and 12th April.

Toowoomba: 17th and 19th April.

Kingaroy: 26th and 27th April.

Maleny: 26th and 27th April.

Miriam Vale: 26th and 27th April.

Dalby: 2nd and 3rd May.

Toogoolawah: 3rd and 4th May.

Nanango: 3rd and 4th May.

Boonah: 9th and 10th May.

Wondai: 10th and 11th May.

Roma: 15th and 16th May.

Murgon: 17th and 18th May.

Wallumbilla: 22nd and 23rd May.

Ipswich: 23rd and 24th May.

Kilkivan: 23rd and 24th May.

Beaudesert: 29th and 30th May.

Marburg: 2nd to 4th June.

Mackay: 4th and 7th June.

Woombye: 20th and 21st June.

Lowood: 22nd and 23rd June.

Rockhampton: 21st to 23rd June.

Kileoy: 28th and 29th June.

Woodford: 11th and 12th July.

Wellington Point: 14th July.

Caboolture: 19th and 20th July.

Mount Gravatt: 21st July.

Barcaldine: 24th and 25th July.

Rosewood: 25th and 26th July.

Pine Rivers: 27th and 28th July.

Sandgate: 3rd and 4th August.

Brisbane Royal National: 6th to 11th August.

Wynnum: 31st August and 1st September.

Zillmere: 8th September.

Laidley: 13th and 14th September.

Beenleigh: 20th and 21st September.

Kenilworth: 4th October.

Ascot: 24th October.

Pomona: 21st and 22nd November.

Millaa Millaa: 23rd and 24th November.

Event and Comment.

A Timely Defence of Australian Scientists.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has received the following memorandum from the Director of Fruit Culture (Mr. A. H. Benson, M.R.A.C.) in relation to the several paragraphs that have appeared in the Press commenting upon alleged inaction of the Department in relation to the investigation and prevention of diseases in fruit, and making comparison with the methods adopted in America, a country with a population of about 118,000,000:—

"Judging from the letters and paragraphs that appear from time to time in the public Press, one would be inclined to believe that the only part of the world in which anything is known regarding fruit and other pests is the United States of America, and that as far as Australia is concerned, there is no one competent to give advice on these matters. This is decidedly unfair to the many able men who have devoted years of study to these matters under Australian conditions, and who have met with many successes as well as certain failures.

"In these respects they compare more than favourably with their American confreres, as it does not seem to be known by the general public that diseases, such as the Pear Blight, Peach Rosette, Peach Yellows, Citrus Canker, the Boll Weevil of cotton, the Pink Boll Worm, to say nothing of the Gipsy Moth which has destroyed countless millions worth of timber, have been investigated not only by the scientists attached to the Department of Agriculture in Washington, but also by those employed by the several States of the Union. For many years past these scientists have worked without any appreciable results, as they are little further forward now with respect to the treatment of these pests than they were many years since, despite the fact that money in practically unlimited quantity has been available for carrying out the necessary research.

"Pear Blight and Peach Yellows have alone totally destroyed areas of fruit that would cover many times the whole area under fruit in Queensland. Of the Boll Weevil in cotton, the destruction caused by it is so immense that its effect has become one of world-wide discussion. Similar histories in varying degrees apply to the other diseases mentioned, to which several others might be added.

"If, therefore, success has not been achieved under such favourable conditions, it is certainly not fair to blame those in Australia who have been responsible for instructing agriculturists and horticulturists regarding the destruction of the various pests attacking their fields or orchards because they have failed to find absolute remedies for pests such as fruit flies, insects which the best brains in all parts of the world have hitherto failed to deal with effectively."

The Sunspot Minimum and Jensen's Theory.

Dr. Jensen's theory of the inter-relation between sunspots and terrestrial disturbances was commented on in the October "Journal's" reference to the solar eclipse. The recent phenomenon, it was stated, had clearly demonstrated that we were approaching a sunspot minimum, which in its turn raised the question whether the earth's climate and such phenomena as earthquakes, volcanic eruptions, and droughts were influenced or not by sunspot conditions. Since that article was published, the cables have informed us of an earthquake in Chili, which destroyed several towns, a tidal wave following the shock which rendered thousands homeless, whilst particulars came to hand only a few days ago of another terrestrial disturbance in Japan, which destroyed four villages in the vicinity of Nagasaki.—"Queensland Government Mining Journal."

The Meston Mangosteen—An American Inquiry.

To comply with a request from the United States Department of Agriculture an ascent of the Bellenden-Ker Ranges to obtain specimen plants from these high altitudes of the delicious Queensland fruit, Meston mangosteen, will be undertaken shortly by Messrs. C. T. White (Queensland Government Botanist) and E. W. Bick (Curator of the Botanic Gardens). The United States Department desires the specimens, in fact both seeds and plants, in order to try the fruit out in the various sub-tropical stations in Florida and Hawaii. The ordinary mangosteen can be grown almost anywhere, but the Meston variety is purely sub-tropical and has thrived in Java, Singapore, and in similar climates. The American experts anticipate that specimens obtained from the high altitudes of Northern Queensland will do well for hybridising purposes, or as a stock at the ordinary sub-tropical experimental stations.

Night Harvesting by Electric Light.

Officers of the Victorian Agricultural Department have expressed interest in the report of the farmer in the Albury district who successfully harvested a large portion of his crop at night by the aid of electric lights attached to the harvester.

Several considered that this was the forerunner of the general adoption of electricity for work in the field. The extension of the Morwell system to the country districts, they said, would do much to hasten the application of electricity to the work of the farm. There were many occasions, one officer observed, on which hasty gathering of the crop was essential if it was to be saved, and the possibility of working at night would mean the difference between success and failure. When heavy winds were imminent early harvesting would prevent loss from the grain "shaking out." With wheat at 5s. per bushel, this loss usually represented a considerable sum. Definite proof of the advantage to be expected from night harvesting was given at the Government farm at Werribee. Hay from experimental plots, which had been stooked in the field owing to the limitation of time for carting in was carried by the high winds on to the adjoining farm, and the sheaves were so intermixed that the manurial tests for oats were seriously affected.

Rural Credit—A South African Measure.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) is giving close consideration to the question of rural credit and is in touch with the South African Government regarding recent Union legislation on the subject. The full text of the South African Act is now to hand. It is entitled "An Act to provide for the formation, registration, and management of co-operative agricultural societies with unlimited liability, co-operative agricultural companies with limited liability, and co-operative trading societies with limited liability" and marks an important advance in rural finance. It provides for the formation of associations in conformity with the ideas set out in the title with the objects of (a) disposing of the agricultural products or livestock of members in the most profitable manner; and (b) manufacturing or treating the agricultural or livestock products of members and disposing of the products so manufactured or partly manufactured in the most profitable manner.

Other objects include the purchase and supply co-operatively of implements and all farming requisites; the manufacture or treatment of farming requisites, including manures; to purchase and to work on behalf of members implements and machinery; to purchase and control breeding stock; to carry on supply stores under the co-operative system; to provide for cold storage; to carry on crop, produce, or livestock insurance, orchard spraying or cleansing, fruit packing, ploughing, and other farming operations for members on a co-operative plan; to provide competent instruction and advice; to disseminate farming information; to disseminate information on the markets of the world, and on co-operation in general; to carry on banking and insurance business under a co-operative system; the formation of co-operative trading societies on a limited liability basis and similar societies on an unlimited liability basis.

A chapter of the Act sets out the liability of members and capital. The conditions of membership laid down for unlimited liability societies provide for all of its members to be jointly and severally liable for the payment of debts and obligations of the society. The liability of any member who resigns, dies, or is expelled ceases in respect of debts and obligations incurred after he ceases to be a member; and in all other respects as soon as the balance-sheet and profit and loss account of the society disclose a credit balance in favour of the society. No unlimited liability society formed under the Act is required to have any fixed capital. The funds necessary for the carrying on of the operations of such a society shall consist of (a) capital funds, including any loans raised by the society; and (b) revenue funds, including the reserve fund. No loan in excess of £100 shall be raised by any such society without the approval of at least two-thirds of the members present at a general meeting specially convened for the purpose, of which notice, stating full particulars, has been given and unless the board of directors has approved of the loan.

In many other respects the South African legislation is similar to enactments with the same objects of Canada, the United States, and New Zealand, and its provisions generally are worthy of the close study of all interested in the stabilisation of the agricultural industry.

Financing Farmers—New Zealand Legislation.

What may be described as a rural revolution is taking place to-day in most agricultural countries. Everywhere the importance of agriculture as a "key" industry is being realised by legislators and others concerned closely with agrarian affairs. The old methods of financing farmers have come under review and condemnation and now most progressive countries are devising means for meeting a demand for a more equitable system of rural credit. In Australia serious consideration is being given to several systems, and in this respect we have the advantage of the experience of European countries, the United States, and Canada, and now New Zealand. In Queensland particularly it is recognised that no scheme of rural organisation can be complete without some measure for placing rural credit on a more rational basis and all information that can possibly be obtained from countries in which various systems are operating is being gathered with a view to framing similar measures favourable to the Queensland farmer. New Zealand has passed recently a Rural Credit Associations Act to "make provision, by means of the establishment of rural credit associations, for affording financial assistance to farmers and rural workers," which will repay study.

The purpose of this Act is to afford statutory recognition to certain classes of societies established for the mutual benefit of their members, their primary object being the making of advances to their members, secured principally on chattel security. Under previous legislation—the Incorporated Societies Act—the registration and incorporation of a main or central society or association is permitted, and also the registration and incorporation of district or branch societies.

The Act provides that no association shall be registered unless its rules provide for the following matters:—The receipt of deposits, whether from members of the association or others; the payment of interest upon such deposits at rates fixed in accordance with the rules of the association; the authority to borrow additional moneys as may be required by the association; the lending of money (either in cash or by the issue of bonds charged on the assets of the association, and payable to bearer or to order) to members of the association for approved purposes and under fixed conditions; the carrying to a reserve fund of all profits arising from the operations of the association; the appointment of a management committee of the association and of a manager, who shall be the chairman of such committee.

Members of the association are made jointly and severally liable for the liabilities of the association. It is recognised that comparatively few members will be the owners of unencumbered land, and it is provided, therefore, that the liabilities constitute an equitable charge on the assets of the members, subject to encumbrances existing at the time of the incorporation of the society.

The purposes for which loans may be made to members are enumerated as follows:—The clearing, fencing, draining, and general improvement of land in the occupation of a member; the erection of buildings on any such land; the purchase of implements, stock, seed, plants, trees, and other things required in the occupation and use of land; the purchase of tools of trade; the payment of any mortgage, debt, or other liability of the member. Loans to any one member are limited to £500. Administration expenses are kept within bounds by a provision for the payment of one member only (secretary and treasurer), together with an annual allowance to the chairman of the management committee.

General Notes.

Pineapple Board Referendum.

In the course of the month a referendum was taken on the question of pooling the pineapple crop. A set of questions was submitted to all registered growers, with the result that a negative majority was recorded. Following are the details of voting:—

DETAILS OF VOTING.

District.	Question No. 1. Are you in favour of a Pineapple Board for all Pineapples?		Question No. 2. If not, are you in favour of a Board for Smooth Leaf Pineapples only?		Acreage on the All-Pineapple Pool.	
	Yes.	No.	Yes.	No.	Yes.	No.
Woombye District	30	126	37	122	170	644
Palmwoods District ..	48	34	42	37	201	163
Beerburum District ..	166	48	135	44	882	214
Cleveland District	52	115	19	95	227	733
Brisbane and other Districts	33	62	12	34	140	300
	329	385	245	332	1,620	2,054

Tomato Pool Board.

Under the Primary Products Pools Act of 1922, tomatoes grown in the Stanthorpe district have been declared a commodity. A board consisting of the following members has been constituted in relation to it. The members are: Messrs. W. H. C. Laird, S. A. Mitchell, W. H. Passmore, M. E. Sewell, and A. E. Watts. Mr. W. H. Passmore has been appointed chairman of the board.

Instruction in Poultry Keeping.

The poultry instructor, Mr. John Beard, will be at Stanthorpe on 6th February, at Warwick on the 10th and again on the 17th, at Killarney on the 15th, at Allora on the 19th, at Toowoomba on the 22nd, and at Clifton on 27th February next. In the course of his stay in each centre Mr. Beard will endeavour to visit as many of the local poultry yards as possible, and he also hopes to give lectures on poultry breeding, such lectures to be free to the public.

Primary Products Pools Act.—Issue of Regulations.

Regulations have been issued under the Primary Products Pools Act of 1922. These prescribe a form of application which is to be made when asking for an Order in Council for a pool. This application may be made by the Council of Agriculture, representative growers of the particular commodity concerned, or by an organisation representing growers of that commodity. The applicants, after asking for a commodity to be brought under the provisions of the Act and that a board be constituted for such commodity, must also specify the classes of persons who shall be deemed to be growers of the commodity; that is, they must define the class of persons who shall be entitled to vote in connection with the proposed board. For

instance, the definition may be in terms of the number of acres of the commodity grown by each person, or the number of fruit trees or animals he may have, as the case may be. A person who is not entitled to vote will not have his commodity handled by the proposed board. The application must also define the district or districts in which the board shall operate, and the number of members for the proposed board. The application may also include any other representations which it may be desired should be made to the Minister.

The regulations further provide for the taking of a referendum as to whether the pool asked for shall come into operation, and in the event of the referendum being in the affirmative, for the subsequent election of the board. In all voting by growers (which are corporations or in partnerships) each corporation or partnership shall have one vote only, and persons under the age of twenty-one years shall not be eligible to vote. The regulations also lay down the methods of procedure to be followed by boards at their meetings. Provision is made that a board must meet at least once a month, and that all questions dealt with at any meeting shall be decided by majority and by open voting. If a member refuses to vote his vote shall be counted for the negative. No member of a board shall vote in respect of any matter in which he has directly or indirectly any pecuniary interest, and every member who knowingly offends against this regulation shall be liable to a penalty not exceeding £100.

Power is given to the board to require every producer or authorised agent to supply the board with information respecting stocks of the commodity in question held at any time. Producers and agents must also furnish on demand any other information concerning contracts for sale, prices fixed by such contracts, and other matters relating thereto which the board may require for the purposes of administration.

Answers to Correspondents.

Worms in Chickens.

G.C.Y. (Elimbah)—

The Poultry Instructor, Mr. J. Beard, advises:—

1. All your young stock will be more or less infected with worms, the pale-looking ones being affected the most.

Treatment: Give 10 to 15 drops of oil of turpentine in a teaspoonful of warm castor oil, on an empty stomach; two hours afterwards give another teaspoonful of castor oil. The birds should be placed in a box with a wire bottom so that when they pass the worms the latter drop through and can be picked up and burned; otherwise the birds would devour them again. All food should be supplied in troughs, not on the ground.

Preventive: Add to each gallon of water 50 grains of sulphate of sodium and 10 grains of sulphate of iron. Keep up this treatment for two weeks.

2. This Department's poultry pamphlet is out of print, but a copy of the new edition will be forwarded to you as soon as same is received from the Government Printer.

Sudan Grass.

J.W.C. (Stanthorpe)—

The Director of Agriculture, Mr. H. Quodling, advises:—

A number of analyses have been carried out by the Agricultural Chemist to determine exactly at what stage sudan grass is poisonous. Up to the present it has been shown that the second growth of this plant apparently carried more of the poisonous principle. This fact has been borne out to some extent by the deaths of animals having access to young shoots which have sprung up after the first cutting of the plants. In one instance at Toowoomba the death of fourteen head of dairy cows occurred. Samples of the fodder were obtained and submitted to the Senior Analyst of this Department, who found one grain of hydrocyanic acid present per pound of green material. The conclusion formed after carrying out a large number of analytical tests is that sudan grass must be fed with caution—even the first growth—and that the safest time to feed is when the plant has come into head.

Less danger is to be anticipated when sudan grass is cut and allowed to wilt for, say, 36 hours before feeding out to stock.

Probably one of the safest remedies for sudan grass poisoning is copious drenches up to 3 or 4 quarts of molasses, but the affected animals must be treated promptly. The inference to be drawn from this fact is that when feeding green stuff of this or of a similar character, less danger is to be expected when molasses are mixed throughout the chaffed fodder.

Orchard Notes for February.

THE COAST DISTRICTS.

February in coastal Queensland is frequently a wet month, and, as the air is often heavy with moisture and very oppressive, plant growth of all kinds is rampant, and orchards and plantations are apt to get somewhat out of hand, as it is not always possible to keep weed growth in check by means of cultivation. At the same time, the excessive growth provides a large quantity of organic matter which, when it rots, tends to keep up the supply of humus in the soil, so that, although the property looks unkempt, the fruit-producing trees and plants are not suffering, and the land is eventually benefited. When the weed growth is excessive and there is a danger of the weeds seeding, it is a good plan to cut down the growth with a fern hook or brush scythe and allow it to remain on the ground and rot, as it will thereby prevent the soil from washing, and when the land is worked by horse power or chipped by hand it will be turned into the soil. This is about the most satisfactory way of dealing with excessive weed growth, especially in banana plantations, many of which are worked entirely by hand.

The main crop of smoothleaf pineapples will be ready for canning, and great care must be taken to see that the fruit is sent from the plantation to the cannery with the least possible delay and in the best possible condition. The only way in which the canners can build up a reputation for Queensland canned pineapples is for them to turn out nothing but a high-class article. To do this they must have good fruit, fresh, and in the best of condition.

The fruit should be about half-coloured, the flesh yellowish, not white, of good flavour, and the juice high in sugar content. Over-ripe fruit and under-ripe fruit are unfit for canning, as the former has lost its flavour and has become "winey," while the latter is deficient in colour, flavour, and sugar content.

For the 30 or 32 oz. can, fruit of not less than 5 in. in diameter is required, in order that the slices will fit the can, but smaller fruit, that must not be less than 4 in. or, better still, 4½ in. in diameter, and cylindrical, not tapering, can be used for the 20-22 oz. can.

Bananas for shipment to the Southern States should on no account be allowed to become over-ripe before the bunches are cut; at the same time, the individual fruit should be well filled and not partly developed. If the fruit is over ripe it will not carry well, and is apt to reach its destination in an unsaleable condition.

Citrus orchards require careful attention, as there is frequently a heavy growth of water shoots, especially in trees that have recently been thinned out, and these must be removed. Where there are facilities for cyaniding, this is a good time to carry out the work, as fruit treated now will keep clean and free from scales till it is ready to market. Citrus trees can be planted now where the land has been properly prepared, and it is also a good time to plant most kinds of tropical fruit trees, as they transplant well at this period of the year.

A few late grapes and mangoes will ripen during the month and, in respect to the latter, it is very important to see that no fly-infested fruit is allowed to lie on the ground, but that it is gathered regularly and destroyed. Unless this is done, there is every probability of the early citrus fruits being attacked by flies bred out from the infested mangoes.

Strawberries can be planted towards the end of the month, and, if early-ripening fruit is desired, care must be taken to select the first runners from the parent plants, as these will fruit quicker than those formed later. The land for strawberries should be brought into a state of thorough tilth by being well and deeply worked. If available, a good dressing of well-rotted farmyard manure should be given, as well as a complete commercial fertiliser, as strawberries require plenty of food and pay well for extra care and attention.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The marketing of later varieties of peaches and plums, and of mid-season varieties of apples and pears, as well as of table grapes, will fully occupy the attention of fruitgrowers in the Granite Belt, and the advice given in these notes for the two previous months, with regard to handling, grading, packing, and marketing, is again emphasised, as it is very bad policy to go to all the trouble of growing fruit and then, when it is ready to market, not to put it up in a manner that will attract buyers.

Extra trouble taken with fruit pays every time. Good fruit, evenly graded and honestly packed, will sell when ungraded and badly packed fruit is a drug on the market. Expenses connected with the marketing of fruit are now so high, owing to the increased cost of cases, freight, and selling charges, that it is folly to attempt to market rubbish.

During the early part of the month it will be necessary to keep a careful watch on the crop of late apples in order to see that they are not attacked by codlin moths. If there is the slightest indication of danger, a further spraying with arsenate of lead will be necessary, as the fruit that has previously escaped injury is usually that which suffers the most.

Fruit-fly must also be systematically fought wherever and whenever found, and no infested fruit must be allowed to lie about on the ground.

Grapes will be ready for market, and in the case of this fruit the greatest care in handling and packing is necessary. The fruit should never be packed wet, and, if possible, it is an excellent plan to let the stems wilt for a day at least, before packing. This tends to tighten the hold of the individual berries on the stem and thus prevent their falling off.

In the western districts, winemaking will be in progress. Here, again, care is necessary, as the better the condition in which the fruit can be brought to the press the better the chance of producing a high-class wine.

Where necessary, citrus trees should be given a good irrigation, as this will carry on the fruit till maturity, provided it is followed up by systematic cultivation so as to retain a sufficient supply of moisture in the soil.

Farm Notes for February.

Reference was made in last month's Notes to the necessity for early preparation of the soil for winter cereals, and to the adoption of a system of thorough cultivation in order to retain moisture in the subsoil for the use of crops intended to be raised during the season. The importance of the subject, and its bearing in relation to prospective crop yields, is made the excuse for this reiteration.

The excellent rains recently experienced should have a heartening effect on all farming operations, as a good season may now be reasonably expected.

Special attention should be given to increasing the area under lucerne (broadleaf Hunter River), wherever this valuable crop will grow. Its permanent nature warrants the preparation of a thorough tilth and seed bed, and the cleansing of the land, prior to sowing the seed, of all foreign growths likely to interfere with the establishment and progress of the crop. Late in March or early in April is a seasonable period to make the first sowing, providing all things are favourable to a good germination of seed.

Dairymen would be well advised to practise the raising of a continuity of fodder crops to meet the natural periods of grass shortage, and to keep up supplies of succulent fodder to maintain their milch cows in a state of production. Weather conditions, particularly the recent heavy and continuous rains, have interfered a great deal with farming operations. Although abundant supplies of grasses are in evidence, provision should be made for the inevitable period, at maturity, when these lose their succulence.

Many summer and autumn growing crops can still be planted for fodder and ensilage purposes. February also marks an important period as far as winter fodder crops are concerned, as the first sowings of both skinless and cape barley may be made at the latter end of the month in cool districts. Quick-growing crops of the former description suitable for coastal districts and localities, where early frosts are not expected, are Soudan grass, Japanese and French millet, white panicum, liberty millet, and similar kinds belonging to the *Setaria* family. Catch crops of Japanese and liberty millet may also be sown early in the month in cooler parts of the State, but the risk of early frosts has to be taken.

Maize and sorghums can still be planted as fodder and ensilage crops in coastal districts. In both coastal and inland areas, where dependence is placed largely on a bulky crop for cutting and feeding to milch cows in May and June, attention should be given to Planters' friend (so-called Imphee) and to Orange cane. These crops require well-worked and manured land; the practice of broadcasting seed for sowing at this particular season encourages not only a fine stalk but a denseness of growth, which in itself is sufficient to counteract to some extent the effect of frost.

In the majority of agricultural districts where two distinct planting seasons prevail, the present month is an excellent time for putting in potatoes. This crop responds to good treatment, and best results are obtainable on soils which have been previously well prepared. The selection of good "seed" and its treatment against the possible presence of spores of fungoid diseases is imperative. For this purpose a solution of one pint of formalin (40 per cent. strength) to 2½ gallons of water should be made up, and the potatoes immersed for one hour immediately prior to planting the tubers. Bags and containers of all kinds should also be treated, as an additional precaution. "Irish blight" has wrought havoc at times in some districts, and can only be checked by adopting preventive measures and spraying the crops soon after the plants appear above the ground. Full particulars on the preparation of suitable mixtures for this purpose are obtainable on application to the Department of Agriculture, Brisbane.

Weeds of all kinds, which started into life under the recent favourable growing conditions, should be kept in check amongst growing crops; otherwise yields are likely to be seriously discounted. The younger the weeds the easier they are to destroy. Maize and other "hoed" crops will benefit by systematic cultivation. Where they are advanced, and the root system well developed, the cultivation should be as shallow as possible consistent with the work of weed destruction.

First sowings may now be made of swede and other field turnips. Drilling is preferable to broadcasting, so as to admit of horse-hoe cultivation between the drills, and the thinning out of the plants to suitable distances to allow for unrestricted development. Turnips respond to the application of superphosphate; 2 cwt. per acre is a fair average quantity to use when applied direct to the drills.

Where pig-raising is practised, land should be well manured and put into good tilth in anticipation of sowing rape, swedes, mangels, field cabbage, and field peas during March, April, and May.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET, AT WARWICK.

1923.	JANUARY.		FEBRUARY.		MARCH.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5.1	6.49	5.25	6.46	5.45	6.24
2	5.2	6.50	5.26	6.46	5.46	6.23
3	5.3	6.50	5.27	6.45	5.47	6.22
4	5.3	6.50	5.28	6.44	5.47	6.21
5	5.4	6.50	5.29	6.43	5.48	6.20
6	5.5	6.51	5.30	6.43	5.48	6.19
7	5.5	6.51	5.30	6.42	5.49	6.17
8	5.6	6.51	5.31	6.41	5.49	6.16
9	5.6	6.51	5.32	6.40	5.50	6.15
10	5.7	6.51	5.33	6.39	5.50	6.14
11	5.8	6.51	5.33	6.39	5.51	6.13
12	5.9	6.51	5.34	6.38	5.51	6.12
13	5.10	6.51	5.35	6.38	5.52	6.11
14	5.11	6.51	5.36	6.37	5.53	6.10
15	5.12	6.51	5.36	6.36	5.54	6.9
16	5.12	6.51	5.37	6.35	5.54	6.7
17	5.13	6.51	5.38	6.35	5.55	6.6
18	5.14	6.50	5.38	6.34	5.56	6.5
19	5.15	6.50	5.39	6.33	5.56	6.4
20	5.16	6.50	5.40	6.32	5.57	6.3
21	5.16	6.50	5.40	6.32	5.57	6.2
22	5.17	6.50	5.41	6.31	5.58	6.0
23	5.18	6.49	5.41	6.30	5.58	5.59
24	5.19	6.49	5.42	6.29	5.59	5.58
25	5.20	6.49	5.42	6.28	5.59	5.57
26	5.20	6.48	5.43	6.27	6.0	5.56
27	5.21	6.48	5.44	6.26	6.0	5.55
28	5.22	6.47	5.45	6.25	6.1	5.53
29	5.23	6.47	...	...	6.1	5.52
30	5.24	6.46	...	...	6.2	5.51
31	5.25	6.46	...	...	6.2	5.50

PHASES OF THE MOON, ECLIPSES, OCCULTATIONS, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer" Time is not used.

3 Jan. ○ Full Moon 12 33 p.m.
10 " ☾ Last Quarter 10 55 a.m.
17 " ● New Moon 12 41 p.m.
25 " ☾ First Quarter 1 59 p.m.

Perigee on 8th at 9.51 p.m.
Apogee on 23rd at 11.24 p.m.

On 3rd January at 9 a.m. the Earth will be in perihelion, its least distance from the Sun about 91,300,000 miles. Three days later Venus will be in perihelion, and will be about 17,000,000 miles further from the Earth than it was on 25th November when in perigee.

On 29th January Mercury will be passing to the west of the Sun about 4 degrees on its northern side.

2 Feb. ○ Full Moon 1 53 a.m.
8 " ☾ Last Quarter 7 16 p.m.
16 " ● New Moon 5 7 a.m.
24 " ☾ First Quarter 10 6 a.m.

Perigee on 4th at 5.18 p.m.
Apogee on 20th at 6.18 p.m.

On 4th February Venus, apparently on the western border of Sagittarius, will be at its greatest western elongation, about 47 degrees from the Sun. On the 6th, soon after sunset, Saturn will be occulted by the Moon when below the horizon, but about four hours later the Moon, Saturn, and Spica will be apparently near to one another low down in the east.

3 Mar. ○ Full Moon 1 24 p.m.
10 " ☾ Last Quarter 4 31 a.m.
17 " ● New Moon 10 51 p.m.
26 " ☾ First Quarter 2 42 a.m.

Perigee on 4th at 8.48 p.m.
Apogee on 20th at 6.24 a.m.

The Moon will be partly eclipsed on the afternoon of 3rd March, and there will be an annular eclipse of the Sun on the 17th, but neither will be visible in Australia.

Saturn will be occulted by the Moon about 2 a.m. on 6th March, when apparently near to the bright star Spica in the constellation Virgo. This fine combination of celestial objects will be then high up in the sky, nearly overhead.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

QUEENSLAND AGRICULTURAL JOURNAL

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FEBRUARY, 1923.

PART 2.

Event and Comment.

A Year of Achievement.

The year 1922 was remarkable for agricultural progress in Queensland so far as constructive and ameliorative legislation of far-ranging effect can be regarded as evidence of progress. The most important of a long list of agricultural measures designed expressly in the farmer's interest, and therefore the national interest, is the Primary Producers Organisation Act, which was foreshadowed by the Premier (Hon. E. G. Theodore) in pre-sessional addresses, and introduced and piloted through Parliament by the Minister for Agriculture and Stock (Hon. W. N. Gillies). This measure has placed under the control of the farmers of Queensland the machinery for their own industrial redemption, and the onus of making the best of a beneficent Act now rests upon them. Legislation is not an end; it is merely a means. There is no short cut to prosperity. We must plan our work and work our plan, and this applies particularly to rural organisation, and more particularly to the tasks confronting the farmers' councils called into being by the legislation of last year.

Babel or Pentecost.

By the time these words are read the ballot for the election of district representatives on the Council of Agriculture will have been taken. In a very striking message to the farmers of Queensland in our last issue, Mr. Gillies emphasised the importance of wise choice in the selection of councillors, and his hope that they would be chosen from men of breadth of mind, honesty, sincerity, ability, stability, and firm faith in the scheme upon which last year's great forward movement was founded was no doubt echoed in the mind of every earnest farmer. On the elected leaders of the movement now depends the future of the farming industry; on them now depends the issue as to whether farmers will arrive at the day of Pentecost or slip back to Babel.

Unity of Purpose and Action.

As has been observed more than once in these columns, there can be little orderly building in an industry unless those concerned unite in thought, purpose, and action. There must be an idea, in the sense of vision, of larger results and better conditions common to the greatest number. The Government has provided plans, specifications,

and layout of a great rural development in Queensland, but the farmers themselves must do the building. The hope of prosperity by ballot is more or less an illusion; there is only one formula that can directly apply to rural organisation, as with our daily aspirations and ordinary avocations, and that is the age-old, four-lettered formula called work.

Necessity Compels Co-operation.

The remarkable preliminary success of the Queensland Producers' Association, incorporated under the Act referred to, is evidence that the Queensland farmer has readjusted his point of view to focus the effects modern social and economic changes are having upon his industry. Necessity has compelled him to affiliate with his fellow farmers in fairness to them and to himself. The pinch of hard times and marketing problems, the futility of solo fighting of trade combinations, both on the buying and selling sides, transport difficulties, and excessive operation costs are the main forcing factors in the general forward move towards wider and wiser co-operation. The pressure of need is one of the primary principles of joint action. Another is combination on a broad, constructive, sound, economic basis now made possible in Queensland by the Primary Producers Organisation Act.

Brains versus Brains.

The sound business way is the only way. No new commercial venture can expect to escape the fierce competition of existing enterprises, directed by keen brains, with which it will inevitably be beset. Brains must be met with brains, and no co-operative concern can expect a full measure of success unless based on modern business principles and economically conducted. This applies to what may be described as the front line activities of the Queensland Producers' Association. The creation of efficient farmers' marketing organisations, as provided for in its incorporating Act, must naturally incur the hostility of interests already entrenched. It is an army axiom, amply proven in practice, that the best defence is offence. A passive or negative attitude is the worst weapon in war. Farmers can only win a fair deal for themselves and their fellows by adopting a positive policy, by planning intelligently and performing effectively the organisation of the selling end of their enterprise.

The Selling End.

After sugar, the dairying industry is Queensland's most important source of agricultural income. Approximately £8,000,000 sterling is the annual value of dairy products to this State. While the question of increased production must be ever before us, it is obvious that no less attention must be paid to the marketing end of the business. In fact, under existing conditions the twin problems of marketing and distribution demand more and immediate attention from those to whom is committed the task of directing rural industries, from the executives of individual co-operative concerns to the men charged with making the Queensland Producers' Association the driving, pulsating force its progenitors conceived. In the current PRODUCERS' REVIEW is set out succinctly the advantage of intelligent organisation at the selling end of one branch of the agricultural industry alone, and which applies equally to other sections. As a result of effective control Queensland dairymen received an additional £200,000 over Southern prices for their produce in twelve months. The REVIEW comment is worth quoting:—

“In this State dairymen are organised more effectively, and as a result of that organisation the prices of local sales have been fixed by a body representative of the dairymen—the Queensland Butter Pool. The personnel of the pool, whose work has not been appreciated at its full value, is as follows:—Messrs. J. Purcell (chairman), T. Flood Plunkett (Logan and Albert), H. M. Stevens (Queensland Farmers'), F. J. Dobson (Caboolture), W. Stephens (Southern Queensland), W. T. Harris (secretary Co-operative Dairy Companies' Association). These gentlemen have capably handled a difficult situation, and, despite repeated efforts by importers of Victorian butter to break the local market, have maintained a price higher than that ruling in the South.

"At time of writing, the wholesale prices in the three chief butter-producing States are as follows:—

	s.	d.	
Queensland	186	8	per cwt.
New South Wales	168	0	"
Victoria	154	0	"

(At one stage the Victorian price touched 144s.)

"If it had not been for attempts by importers to break the market, the local price would have been at least 2d. per lb. more. Failure to obtain that extra 2d. has meant during the last four months a weekly loss to Queensland dairymen of £2,500.

"But what would the loss have been if the market had been broken, and prices had fallen to the Victorian level?

"From 1st October, 1921, to 30th September, 1922, Queensland dairymen received £200,000 more than they would have received if Victorian prices had ruled here."

The Teaching of History.

The PRODUCERS' REVIEW is worth quoting again—

"The teaching of all history is that the farmer can never—in fact, no one can ever—prosper as a mere producer of raw materials.

"The men who dig coal live in huts; the men who handle it in fine houses. The men who grow sugar-cane live humbly; those who control the distribution live prosperously. The agents live much more pretentiously than the dairymen whose butter they sell. And so the list could be lengthened indefinitely.

"Wherefore the farmer is fighting to-day for a larger share of the wealth that he creates. He is fighting to be something more than a producer of raw materials. He is fighting to get and keep for himself the profits that come from handling and distributing—and wiser handling and distributing—of the products of his toil. He is fighting to bring about a realisation of the prophecy uttered nearly 3,000 years ago—

'They shall build houses and inhabit them; and they shall plant vineyards and eat the fruit of them. They shall not build and another inhabit; they shall not plant and another eat.'

"The farmer who does not fight with his brother farmers in their effort to 'make themselves masters of their own industry' is hindering them and hurting their cause. The interests that are fighting to keep the farmer 'a mere producer of raw materials' are wealthy and powerful, but the farmers have only to stand together in order to win. And all must stand together. The present chaotic conditions are due to lack of organisation in the past. The Queensland Producers' Association provides the organisation for the future, and those in control must have the ability to evolve from the present chaotic conditions a system which will ensure to the producer a proper share of the fruits of his labour."

Obstinate Apathy.

The Queensland Producers' Association is rapidly getting into its stride and should soon straddle the rut of obstinate apathy so evident in some restricted rural circles. Among some farmers there is apparently a tendency to drift—a weak sliding backwards into the sapless dreariness of a fatalistic "What's the good," that extraordinary mental attitude with which so many regard every move towards industrial betterment. The Association offers the means of promoting co-operation on the widest possible scale, not only among farmers, but between them and other sections of the community whose interests are identical or parallel. The possibilities of the State-wide plan have been fully demonstrated, but one of the minor problems of organisation is the indifference of some concerned directly in its success. In such cases, doubtlessly, indifference is due to lack of thought, and vigorous organisation will help to round up the stragglers. To properly develop the great agricultural industry every primary producing unit in the State must be welded into one solid organisation. Farmers individually have everything to gain by making the Association as strong as possible.

QUEENSLAND AGRICULTURE IN 1922.

By H. C. QUODLING, Director of Agriculture.

Subjoined is the full text of the report of the Director of Agriculture (Mr. H. C. Quodling) taken from the Annual Report of the Under Secretary, Department of Agriculture and Stock (Mr. Ernest G. E. Scriven), to the Minister (Hon. W. N. Gillies) for submission to Parliament.

COTTON.

An Encouraging Outlook.

The outlook generally from an agricultural standpoint is most encouraging. The most striking feature witnessed during the year was the very live interest taken in cotton, a crop apparently destined to play a most important part in land settlement. Figures shown elsewhere in the Department's report help to bear this out. These, however, do not present a true indication of what the future holds in store. What actually counts, and can be relied upon to provide a most encouraging perspective and more accurate indication of what may be termed "the pulse" of the industry, is the extraordinary number of inquiries being made through the Department respecting cotton, and the desire generally expressed by persons of settling in the State if facilities are forthcoming. Hitherto, no better opportunity has presented itself of settling large areas of Crown lands in the cotton belt.

At this stage of the resuscitation of an industry, ripe for development under a guarantee price, with the certain prospect of up-to-date ginning establishments already at hand or in prospect for the treatment of the crop, a note of warning should be struck respecting the prevailing idea amongst growers that little else matters on the farm as long as an extensive area of cotton can be put in.

Obviously, the farmer who has the necessary family labour available is the better equipped man for cotton-growing than the one who employs labour. Observation goes to prove that the tendency, in some instances, is to put more land under cotton than can be properly cared for, to the detriment of other branches of farming, dairying, and pig-raising, which might also be reasonably carried out on the same farm.

Quality of Queensland Cotton.

The excellent reports received through the British Cotton Growing Association on the quality of last year's cotton, over 1,000 bales, proved most encouraging, and the average length of fibre— $1\frac{1}{8}$ inches—placed the Queensland article in the long-staple Upland class, which alone is sufficient indication of its quality. It was shown, however, that with a greater uniformity in character and length of staple much better results were attainable. With this objective in view the Department established several seed propagation areas (in temporary quarantine) with seed obtained through the Agent-General, and the Australian Cotton Growing Association also. The cotton-growing on one quarantine area developed a bacterial leaf disease and was destroyed by order of the Chief Quarantine Officer for Queensland. A second area showed traces of the same trouble and is under close observation, with the prospect of the crop being dealt with summarily also. Three other plots at Capella, Charters Towers, and Cooktown made satisfactory development. Seed selection work is in hand in connection with the latter plots, and it is satisfactory to note that every prospect exists of obtaining a sufficiency of seed for about 300 acres for planting in the spring of this year, and if no untoward circumstance obtrudes itself, ample supplies of improved seed should be available to meet all requirements in 1924. In this way there is every prospect of producing a uniform type of cotton with a staple probably reaching $1\frac{1}{8}$ inch in length. Substitution of a variety of cotton of this quality even for the present class of cotton, which is admittedly good, must enhance the value of the State's output in a marked degree.

MAIZE.

The Northern Crop.

The season generally was not as satisfactory as it might have been, although the crops were all that could be desired in certain districts favoured by regular rains during the growing season. Less maize than usual was planted on the Atherton Tableland. The quantity of grain carried over from the previous year was large and the quality indifferent, on account of an exceptionally wet season, and these facts militated against the utilisation of available lands, some of which were devoted to dairying instead. Although Townsville and the Northern markets were open, there was little prospect of competing successfully in the more Southern markets on account of high transport charges. As a result the 1921-22 crop on the Tableland is not expected to exceed 7,000 tons. Although the district's average yield is comparable with the highest obtainable elsewhere, the wet season ceased earlier than usual and the precipitation proved to be slightly below the average.

Lower Southern Yields.

In the main maizegrowing districts in Southern Queensland the summer rains were not so plentiful as in the previous year; this caused curtailment of output.

Seed Improvement.

Good and substantial progress was made with the departmental scheme of seed maize improvement. Fresh importations of grain were made from the United States of America to supplement the varieties now in cultivation. The technical work associated with seed selection and the production of high yielding strains of grain has been placed in the hands of Mr. C. McKeon, Assistant Instructor in Agriculture, whose efforts in segregating and propagating some choice varieties are meeting with success. Thirty plots, aggregating 91½ acres in area, were established in the following localities:—Tingoorra, Murgon, Manyung, Goomeri, Imbil, Kilcoy, Yandina, Boonah, Beaudesert, and Marburg.

The practice of selecting grain from the field propagation plots was continued for the purpose of providing seed for sale to farmers; in this way tangible results should be forthcoming and the returns from individual farms increased.

Three useful varieties have been added to those commonly grown by an importation of seed from the United States of America, viz., Funk's Ninety-day, Funk's Yellow Dent, and Eureka. In summarising the results of the season's trials, Mr. C. McKeon, the maize specialist, stated as follows:—

“The Funk's Ninety-day gave easily the best results of the imported varieties with a yield of 55 bushels per acre. The type proved to be very even and the variety a heavy yielder.”

Other results obtained from departmental seed were generally most encouraging and afford evidence that careful selection of high-yielding strains is calculated to improve the standard and aggregate yield of grain in the State.

An extension of the remarks to the latter varieties is as follows:—

“Reid's Yellow Dent returned 70 bushels per acre. The crop at Kilcoy (a four-months one) attracted much attention. Cobs were exceptionally large, with a good depth and type of grain. Husk covering showed a decided improvement. Cobs were carried very low on the stalk and turned down well during ripening.

“Golden Beauty Maize, a five-months corn, grown also in the Kilcoy district, returned 85 bushels per acre. This variety gave very fine results. It was raised from seed selected from low-bearing plants, and the improvement in the position of ear was very marked. Type of grain good, and husk covering very good.”

Improved Yellow Dent grown at Bunjurgan, near Boonah, averaged 90 bushels per acre—

“An exceptionally fine crop. Weather conditions throughout were very favourable. Cobs were very large and of splendid type. Plants were spaced 2 feet apart in the rows, which probably accounts for the extra development of the ears and grain. Easily the best crop of the season.”

To encourage the production of specified types of grain, arrangements were made with the Royal National Agricultural Association to revise their schedule for maize.

The work designed for the purpose of determining the amount of moisture in Atherton-grown maize—in the field, barn, bag, and tank—has been consistently followed up and some useful information compiled. Mr. Field-Assistant Wise, who has been engaged in the compilation of data, is following up the matter of moisture content of marketed grain to complete a series of tests.

WHEAT.

Better Grain.

Although the aggregate yield proved to be somewhat less than last year, the quality of grain was better; in fact, only a small percentage proved to be under f.a.q. standard. Results of this character compare more than favourably with the best wheat-producing States in the Commonwealth.

The Wheat Board's operations were facilitated in no small degree by having grain of this excellent description to handle. Overseas shipment of grain was continued by the Board, and Queensland wheat has been well received by the trade.

Co-ordination of Activities.

The co-ordination of activities of the Department and the Wheat Board, for the betterment of the industry, was arranged in time for the present planting season, and put into practice. All available stud seed from State farms and field propagation plots was placed with approved growers, whose land was first inspected by a member of the Board in company with an officer of the Department. The reduction aimed at in the number of varieties in cultivation—from about 70 to 22—is a first step towards the elimination of many unsatisfactory kinds. The outline of the scheme is appended:—

1. The Department of Agriculture to co-ordinate its wheat-breeding and wheat-testing work and to link it up with the activities of the Wheat Board.
2. The scientific and technical work necessary to give effect to the scheme to be carried out as at present by the Department of Agriculture, and when seed of improved varieties recommended by the Department is available from time to time in sufficient quantities, the Board to take it over by purchase (at a price to be mutually agreed upon at the time) and make arrangements for sowing the respective varieties in localities and on picked areas recommended by the Department as suitable for the purpose of propagating supplies of the several kinds.
3. The Board, in sequence, to secure seed from these sources, rail it to its central dépôt for cleaning, fumigation, grading, and storage, for ultimate despatch to the localities decided upon for the commercial propagation of specified types of wheat.
4. For the purposes of the successful working of the scheme, and of the production of standard types of grain, the State to be classified into districts or zones, so that efforts may be directed towards the growing of suitable types and varieties within each for delivery to, and subsequent distribution by, the Board. In this way it would be possible to draw upon certain classes of grain for milling or export, as may be required.
5. That a classification be made of varieties now in cultivation, with a view to the discarding of those which are undesirable or unsuitable for Queensland conditions, or which are of soft, starchy, poor milling, or indifferent keeping qualities.
6. That the Board take the necessary steps to further this latter object by ensuring the delivery by the grower of all wheat to the Board which comes under this latter category. In this way, the usual reservations or arrangements for next season's seed by the grower will be brought into line with the policy of standardisation, as the approved wheats can then be supplied in lieu thereof.
7. That for the purpose of ensuring the preservation of supplies of pure seed of varieties finally approved of under the scheme, the Department to continue the work of seed selection by maintaining small nursery plots at its wheat-breeding or on other farms, with the object also of the improvement by selection, and the maintenance of certain strains within the respective varieties, which could be drawn upon should the identity or purity to type of the original varieties require to be renewed at any time.
8. That seedsmen dealing in seed wheat be furnished with an outline of the scheme in order to secure their active co-operation in effecting its aims and objects by placing varieties purchased from the Board, or other sources, with growers in districts or zones to which such varieties have been allotted.

Field Tests and Trials.

The officer deputed to carry on last season's field tests and wheat trials, Mr. C. S. Clydesdale, Assistant Instructor in Agriculture, reported good progress in all operations. Work of this character, dependent as it is on the highly technical and skilled efforts of the manager of the Roma State farm in breeding up and selecting new types of wheat, is demonstrating in a marked degree that Queensland's requirements are being catered for and successfully met. Farmers are showing a greater interest in this class of experiment work than formerly, which is tangible evidence that its importance is recognised.

Ten varieties of wheat, produced at the Roma State farm, were tested at different centres—Allora, Jandowae, Bell, and Inglewood—under field conditions, the plots aggregating 46½ acres in area, the highest yield being recorded at Inglewood with "Cedric," 30 bushels per acre.

The comparative trials of over 130 varieties of wheat, principally new crossbreds, admitted of the selection of a limited number exhibiting improved field characteristics and ability to resist rust; and these latter have in turn been sown again this season

in larger areas to admit of extension trials under field conditions. This gradual process of evolution is calculated to furnish further evidence of the fitness or otherwise of the varieties for general cultivation, providing that the imprimatur of the chemist and miller is received.

Wheat taken from one of the Department's seed propagation plots proved to be of good quality, and when exhibited by the grower at Toowoomba was only beaten by .5 in a strong competitive class.

Prospects Promising.

Touching the question of the industry generally, matters appear to be promising, as the area put under crop and in course of preparation for planting should show an increase on last year's figures.

Good rains fell during the month of June, and expectations of suitable conditions for germination were realised.

Arrangements have been made by the Wheat Board for increased storage accommodation at several railway centres, which will go a long way towards the removal of disabilities in this direction.

Barley.

The growing of malting barley (once a specialised industry) appears to have its limitations, due to the restricted local demand by brewers. The generally accepted opinion is that Queensland is capable of producing large quantities of first-class barley if a profitable market could be found. Last year's crop was ravaged in some localities by the so-called "army worm," which occasioned damage.

Darling Downs farmers, many of whom are dairying in conjunction with crop raising, are paying attention to the growing of cape and skinless barley as a fodder crop for grazing off, with good results.

Canary Seed.

Canary seed growers, who harvested good crops, found themselves restricted in a marked degree in the matter of a payable price and an indifferent demand for their product, so decided to form a "pool" in order to regulate supplies and prices, but at the time of writing the price still remained low and the demand less active than formerly.

Lucerne.

Lucerne still holds pride of place in many districts where its cultivation is specialised in, but the excellence of the plant for cropping purposes calls for a wider recognition of its value on the average Queensland farm, it being generally recognised that if more lucerne were grown on dairy farms it would naturally follow that better results would be obtainable through the use of a protein-yielding food, an essential in milk production.

English Potatoes.

Of the varied assortment of crops grown (particulars concerning which are to be noted in the statistical returns), *English Potatoes* occupy an important position as a food crop. It is an anomaly to find that such a large quantity of potatoes still find their way here from Southern States, a circumstance which means a big loss to Queensland growers.

Sweet Potatoes.

Facts made known concerning the quality and extraordinary yields (over 30 tons per acre) of potatoes obtained in the trials carried out by the Instructor in Agriculture at Rockhampton, Mr. G. B. Brooks, have focused attention on this crop, and it is significant that upwards of 10,000 cuttings were sent out last year from propagation plots, the distribution covering a wide range of country. Evidence of this character serves to indicate that growers recognise the importance of making the best use of their land for the production of maximum crops.

The pamphlet on "Sweet Potatoes," prepared by Mr. Brooks for publication (affording as it does a wealth of technical detail dealing with the classification of varieties), promises to provide a very useful and instructive addition to the printed matter on this subject.

Dairy and Pig Fodder Plots.

Reference was made in last year's report to the establishment of dairy fodder and pig fodder plots on the North and South Coasts respectively. The results generally were excellent, the season being an exceptionally favourable one. Returns of this character should be sufficiently convincing without further elaboration.

RESULTS OF DAIRY FODDER TRIALS.

Varieties.	YIELDS PER ACRE OF GREEN FODDER.											
	A. Hulse, Yandina.				F. G. Burton, Bridges.				J. B. Stephens, Nindooimbah.			
	Tons	cwt.	qr.	lb.	tons	cwt.	qr.	lb.	tons	cwt.	qr.	lb.
Prince wheat and peas ..	16	16	2	12	2	14	0	2	13	10	0	10
Prince wheat and vetches	10	16	0	8	6	1	2	4	11	17	2	20
Patriot wheat and peas ..	16	4	0	12	9	2	0	0	14	0	3	16
Patriot wheat and vetches	11	6	3	4	2	0	2	1	12	18	1	26
Rye and peas	10	16	0	8	5	5	1	9	14	11	2	22
Rye and vetches	7	11	1	0	Destroyed by wallabies				16	4	0	22
Cape barley and peas ..	12	3	0	9	10	16	0	8	13	10	0	10
Cape barley and vetches ..	7	11	1	0	2	19	1	19	(two cuttings)			
Skinless barley and peas ..	11	6	3	14	Destroyed by wallabies				15	2	2	0
Skinless barley and vetches	5	13	1	21	Destroyed by wallabies				5	18	3	10
Ruakura oats and peas ..	9	9	0	7	4	3	2	25	18	18	0	14
Ruakura oats and vetches	7	11	1	0	Destroyed by wallabies				17	16	2	2
Algerian oats and peas ..	8	18	1	1	3	6	0	19	9	3	2	18
Algerian oats and vetches	6	15	0	5	Destroyed by wallabies				9	14	1	24

The yields generally on Mr. F. G. Burton's plots were reduced by the depredations of wallabies.

Seed sown 17th and 18th May on F. G. Burton's farm and on 26th and 27th May on A. Hulse's farm.

Rainfall taken at Yandina during period of growth of crop 20.71 inches—twenty-eight wet days.

Seed sown on J. B. Stephens's farm, 17th and 18th May.

Rainfall during period of growth of crops 18.93 inches—forty wet days.

RESULTS OF PIG FODDER TRIALS.

Varieties.	A. Hulse, Yandina, N.C.				F. G. Burton, Bridges, N.C.				J. B. Stephens, Nindooimbah.			
	Tons	cwt.	qr.	lb.	tons	cwt.	qr.	lb.	tons	cwt.	qr.	lb.
Yellow globe mangel ..	35	2	0	26	28	12	2	10	23	15	1	12
Long red mangel ..	33	17	0	19	52	13	1	11	24	6	0	18
Sugar beet ..	32	8	0	24	24	6	0	18	20	14	0	15
Silver beet ..	15	17	1	11	10	11	0	18	9	0	0	6
Scotch kale ..	9	9	0	7	No record				Not sown			
Dwarf Essex rape ..	16	4	0	12	16	4	0	12	10	5	2	24
Purple-top swede ..	24	6	0	18	51	17	0	16	13	10	0	10
Elephant swede ..	25	13	0	19	32	8	0	24	16	4	0	12
White Belgian carrot ..	11	12	1	3	No record				19	6	0	14
Large drumhead cabbage	27	10	3	26	No record				17	5	2	24

Seed sown on F. G. Burton's and J. B. Stephens's farms, 18th May. On the 25th May on A. Hulse's farm.

Rainfall 20.71 inches for Messrs. Burton and Hulse's farms (twenty-eight wet days), and 18.93 inches for J. B. Stephens's farm (forty wet days).

STATE FARMS.

Gindie.

Development work, directed towards the improvement of the property, including that of water supply, fencing, and of erection of yards, improvement to cattle dip, &c., has been carried on throughout the year and more efficient control attained. New cultivation areas were added to the existing ones.

Much preparatory work was given to the main cultivation areas to provide supplies of hay and ensilage for stud stock and working horses, and the extra cultivation resulted in exceptionally good crops of hay, wheaten yielding 2 tons per acre and oaten 30 cwt. Good weather was experienced for curing the crops. Approximately, 100 tons of maize were cut and chaffed into the silos.

The season generally was favourable (approximately 26 inches of rain) for the stud herd of shorthorns, and the young stock are very promising, but prices for young bulls for herd improvement have dropped in keeping with the present depression of the cattle industry. Three shows were attended during the year with teams of cattle to advertise the stock, and honours won throughout. At Rockhampton good competition had to be met, and the farm carried off the champion prize for bull with an animal bred on the place, beating last year's champion, an imported animal. Females also bred on the farm gained most of the prizes, although unsuccessful in the championship. The aim throughout to produce typical sires for sale to improve the quality of district herds is meeting with success. Three animals of our own breeding were put over the scales to determine whether the early maturing qualities claimed for the cattle had been realised; the weights bear this contention out. The champion bull—Gindie Duke of Beauford 2nd, 28½ months old—turned the scale at 1,834 lb., whilst two young cows in the fat stock section weighed 1,518 and 1,442 lb. respectively.

Kairi.

Development work in the way of falling an area of over 50 acres of scrub was undertaken. Maintenance of existing areas proved a heavy item, as undergrowth and weed-growths, forced into activity by a generous rainfall, had to be coped with. Stud stock (Jerseys and Illawarra shorthorns) have improved in numbers and quality, and the work of classification has entailed the testing of a large number of different samples of milk from individual animals in the herd. The dairying industry has assumed large proportions on the Tableland, and evidence goes to prove that herd testing is a work which cannot long be delayed.

An excellent demand has set in for cane sets from sugar districts below the range, it being recognised that the change of climate undergone on the highlands here by the varieties being grown to meet this demand will have an excellent effect and overcome disabilities which cane is subjected to when grown consistently under forcing climatic conditions on the coast.

The stud of Berkshire pigs has increased, and when matters were practically booming in this line in keeping with developments expected in the way of a co-operative factory, the demand for animals for breeding purposes was difficult to meet; as the factory proposition is not finalised, interest in this excellent side line to dairying has waned.

The purchase of a young Suffolk Punch stallion from the well-known Dangar stud in New South Wales has equipped the farm with a long-felt want.

Warren.

— The season was not as satisfactory as it could have been, owing to the falls of rain being sporadic in character. Throughout the year effort has been directed towards putting the property on as efficient a basis as possible, and minor improvements were consistently directed towards this objective. Useful experiment work was engaged in and added interest shown in the farm operations. A feature which promises well from an educational standpoint is the instructional work to pupils of the local school, who are keen to acquire a knowledge of agriculture. Lectures and practical demonstration work have been combined. It is purposed to extend this class of instruction and co-operate with the head teacher of the school.

Arrowroot, grown on a 3-acre demonstration area, has proved itself a very valuable crop for providing large supplies of "bulbs" for pig-feeding purposes. Local farmers are interested, and the experiment is one of the most striking successes of the year's operations. It was also demonstrated that the ordinary dun field pea, when grown under field conditions, was another valuable crop to the district, the growth of the crop and the selling of a large amount of seed bearing this out.

The Ayrshire stud has been maintained in a state of efficiency and the young stock are promising. Berkshire pig breeding has proved a profitable line of work, and the animals from this farm are doing much towards improving the standard, both of breed and quality, of the district's pigs.

Hermitage.

The principal work of the year was directed towards the testing of a large number of different varieties of wheat, barley, and oats, both in the stud seed selection rows and in larger areas under field conditions. Co-operation was arranged in the comparative tests of over 130 Roma State farm crossbreds, and although sown rather late in the season, the results were conclusive in respect to the susceptibility of certain strains to rust, and more pronouncedly so regarding the quality looked for in carrying out the trials, i.e., rust resistance. Comparisons drawn from these tests and of the field trials have shown that some varieties possess extraordinary powers of rust resistance. This elusive quality in the field characteristics of wheat has evidently been fixed. Seed supplies of some of these have been made available to farmers for the present season's sowing.

During the year the farm was used as a depôt for a quantity of seed wheat from demonstration plots carried out under the Field Branch of the Department, and the whole of the grading and despatch of the grain was undertaken.

The sheep kept on the farm have been improved by careful culling, and proved valuable in conjunction with the raising of wheat and other cereals.

Roma.

Wheat-breeding work, for which this farm was principally established, absorbs a good deal of time and attention, but the results of several years devoted to this all-absorbing subject are now manifest. Encouraging reports have been received of the several new varieties which have been brought into cultivation, and it is satisfactory to be able to record the fact that a distinct objective has been attained in the co-ordination of the technical work on the one hand, carried out in the evolution of new strains of wheat at this farm, with that of the demonstration plots conducted by the field branch of the department and the linking up of these several activities with those of the Wheat Board. Propagation of improved varieties of this character under conditions to insure purity of type, and their substitution for older and possibly inferior kinds, should have an excellent effect on the industry. Fertiliser trials carried on for a number of years, effecting, as they have done, some slight improvement in the yields of grain by the use of special mixtures, have not yet shown that fertilising will pay, unless the quantity of fertilisers applied can be reduced to a minimum.

AGRICULTURAL CHEMISTRY.

Valuable work has been carried out by the Agricultural Chemist in the milling of new crossbred wheats and in the testing of the nutritive qualities of the resultant flour. One feature of outstanding importance is the fact that Queensland-grown grain is equal in quality to grain grown in the other States, and, in a number of instances, it has shown out to advantage. This farm has participated in the comparative tests of Australian varieties carried out in conjunction with the Bureau of Science and Industry.

Another section of plant-breeding work taken up a few years ago, viz., that of the production of new varieties of grapes, is affording some excellent data.

A retrospective view of the year's work indicates that good progress has been made. My thanks are due to the whole-hearted and loyal efforts of the staff throughout the three divisions of the State—North, Central, and South.

THE QUEENSLAND DAIRYING INDUSTRY.

A YEAR'S REVIEW.

By E. GRAHAM, Director of Dairying.

The following review of the dairying industry in Queensland is taken from the Annual Report of the Under Secretary, Department of Agriculture and Stock (Mr. Ernest G. E. Scriven), to the Minister for Agriculture and Stock (Hon. W. N. Gillies) for presentation to Parliament.

A feature of the season just terminated was the favourable weather conditions which prevailed throughout the spring, summer, and early autumn months, and changed adversely to dairying for the remaining portion of the year.

The lack of rain during March and April was responsible for a curtailment in the amount of green fodder usually available for dairy stock, and the customary feeding-off of the young crops of wheat by the dairy herds during the winter months in the Downs district did not take place. Dairy farmers in the coastal areas were unsuccessful in raising satisfactory crops of sorghums, implee, &c., so generally utilised for winter feeding, because of the comparatively dry condition of the soil during the months when crops of this nature make much of their growth.

The comparative scarcity of fodder on the farms, coupled with a winter more severe than the average, resulted in a pronounced reduction in the milk yield, affecting in turn the complement of butter and cheese produced within the closing months of the season.

A New Record of Production.

Despite the foregoing unfavourable seasonal conditions, the amount of dairy foodstuffs produced within the year was in the aggregate considerably in excess of the quantity manufactured within the former year, and consequently a new record of production has been established in this State. Formerly, the high mark of butter production in Queensland was credited to the season 1920-21, but the production is higher this season. The following are the particulars of the production within the respective seasons:—

Season.	Amount Butter Production.
1920-21	40,751,373 lb.
1921-22	60,923,194 lb.
Increase for season 1921-22	20,171,821 lb.

No change occurred within the year to the uses to which the milk raised on the dairy farms was ultimately placed. The milk produced was utilised for domestic purposes and in the production of butter, cheese, or condensed milk, the production of butter claiming by far the larger proportion of the total amount of the milk raised.

Generally, the standard of quality of the dairy produce manufactured within the year was well maintained. A number of factories effected an improvement in the quality of the butter manufactured therein. Especially was this noticeable in the cases where pasteurisers were installed and the pasteurisation of the cream supply carried into operation.

Neutralisation and Pasteurisation.

It is calculated that at present at least 90 per cent. of the total amount of butter manufactured in this State is made from cream which has been subjected to neutralisation and pasteurisation prior to churning.

The few remaining companies which have so far refrained from adoption of pasteurisation of cream intend to install the necessary plant and carry the process into practice at their factories if it is found that any considerable percentage of their output of butter is being submitted for export overseas. It is anticipated that practically the whole of the butter intended for export during next season will be from churnings of cream to which pasteurisation has been applied.

Although the beneficial effects accruing to the quality and keeping properties of butter as a result of pasteurisation of the cream supplies are widely known and accepted by manufacturers, several experiments were carried out during the season for the purpose of testing the efficiency of pasteurisation towards arresting the deterioration in the quality of butter intended for cold storage extending over lengthy periods, such as is involved in the exportation of butter to markets in Great Britain

and other countries overseas. In every case the results of the experiments were in confirmation of the results of former experiments which had been carried out from time to time, and go to provide, if such is necessary, additional evidence in support of pasteurisation.

Generally, the quality and appearance of the butters coming forward for market indicate that factories are giving closer attention to what may be described as the details in manufacture than was the case during the war and the years immediately subsequent to it. This may be regarded as a healthy sign and be taken as an indication that manufacturers are alive to the importance of zealously guarding the reputation of dairy produce of Queensland origin and the necessity to avoid any loss of prestige which would assuredly take place if laxity in attention to the methods of manufacture is allowed to creep in.

Market Conditions.

The reversion to open market conditions in Great Britain that occurred during the year brought with it a return to the older and more established order of affairs, under which dairy produce of this State is brought into open competition with that of other countries; but in another respect the position of the market was unique, because of the heavy accumulation of stock of Australian butters which were owned and held in cold storage by the Imperial authorities, and it was found most difficult to dispose of the new season's make of Australian butter in either satisfactory quantities or at remunerative prices. Merchants were afraid to purchase large quantities of butter, bought in a hand-to-mouth way. These conditions prevailed throughout the earlier portion of the season, and eventually the Imperial authorities decided to unload the stocks of stored butter held by them. It is understood that this butter was sold at a figure considerably less than half the amount of the original purchase cost. Immediately those stored butters were made available to consumers at a comparatively low price, the market for freshly-made Australian butters collapsed, and as a result the dairy industry here received a severe shaking.

Manufacturing companies were for some months unable to gauge accurately the true position of the markets, and with nothing more for their guidance beyond the definite knowledge that the value of butter had become depreciated and the condition of the market reduced to a disorganised and chaotic state, exporting companies were placed in a most awkward position, particularly as they had further quantities of butter shipped on consignment, upon which it appeared that they would be faced with heavy reclamations.

It was natural, under the circumstances, that manufacturing companies sought to protect themselves against additional monetary loss by adopting the only means within their power, and that was to materially reduce the rates for cream delivered to them; and in this way the value of cream was reduced to a figure lower than that recorded within the past ten years.

The adjustment made in this manner was efficacious in adding to the security of the position of manufacturing factories, but it did not tend towards the alleviation of the difficulties which producers were experiencing. Excessively low rates for cream brought consternation amongst dairy farmers, who found it impossible to carry on dairying profitably. Luckily, this unsatisfactory condition of affairs was short-lived, as fortunately the market for dairy produce recovered much more rapidly than was generally anticipated, principally on account of the demand for the cold-stored butters being stronger than it was expected would be the case even by those closely connected with the trade. The butters were eagerly sought after by consumers, and the incident indicates that the appetite of the consuming public for butter has not been seriously affected either by the rationing of supplies, as was customary for some years past in Great Britain, or by the enforced use of margarine as a substitute for butter. Evidently there still exists practically an unlimited demand for butter provided the quality is satisfactory and the price within the purchasing power of the people.

The rapid recovery of the market brought considerable relief to producers, and the oversea market has now assumed a much more buoyant tone, and with little or no butter carried over in cold stores a continuance of satisfactory prices may be reasonably expected. Certainly the prospects for the approaching season are encouraging and the outlook is decidedly in the producers' favour.

Cold Storage.

The matter of the inadequacy of cold storage accommodation available for the storage of dairy produce has been referred to in former reports upon the industry, and the importance of ample and efficient cold storage, affecting as it does the

quality of the dairy produce intended for export and the progress of the industry generally, has been specially mentioned.

The complement of dairy produce coming forward during the flush of a normal season has reached a point beyond the capacity of the existing cold stores, and the Government has, in consequence, decided upon the erection of a cold storage premises, which will be situated on a water frontage at Ilamilton. It is intended that provision shall be made within the cold storage premises to allow for the cold storage of dairy produce, fruit, eggs, and products of like kind.

The work of construction of the necessary buildings and wharfrage accommodation for vessels receiving refrigerated cargo from the stores has been under way for some time past, and the progress made to date gives promise of a section of the premises being completed and available for use for storage purposes early in the new year.

Improved Shipping Service.

Throughout the year a much-improved shipping service than that on offer for seven or eight years past has been enjoyed, and the export section of the industry has benefited accordingly. Ocean liners carrying produce in refrigerated chambers have left our port with greater frequency of late, and, in addition, transit charges have been reduced somewhat.

Revival in Interstate Trade.

There has taken place a revival in the interstate trade in dairy produce, which may be attributed to the abandonment of "winter-pooling" of butter—a practice which owed its origin to the war. The requirements of Southern States in butter fluctuate considerably in agreement with the winter season experienced by them. The indications are that the volume of the "interstate trade" in butter during this winter will exceed 30,000 boxes. The popular taste in Australia is for "fresh" butter which is held in preference to butter which has been subjected to cold storage.

A comparatively small quantity of butter was introduced by merchants into Victoria from New Zealand during the earlier months of the winter, and by far the greater portion of this butter was utilised for the purpose of the trade in tinned butter, and it was ultimately reconsigned by Victorian merchants to the markets in the East. By arranging to carry out the tinning operations in bond, payment of the duty charges imposed upon imported butter was avoided, and it thereby became possible to land New Zealand butter in Victoria, repack the butter into tin containers in bonded store, and later ship it to the East at a cost lower than the then prevailing quotation for Queensland butter. No exception can be taken to the indulgence in a trade of this nature, but the incident is mentioned because it was reported that the reason of the intake of butter from New Zealand was to the quality of Queensland butter being found unsatisfactory for the Melbourne market, but the statement was ill-advised, and quite unwarranted on the grounds alleged.

It was really the matter of difference in the relative cost of purchase between Queensland and New Zealand butters that militated against the exclusive use of Queensland butter for the purpose of meeting the entire shortage of Victorian requirements in butter. In other words, New Zealand was prepared to accept a price for butter which, exclusive of import duty, was somewhat below the figure at which Queensland was prepared to do business at the moment the purchase was effected. Only a limited quantity of butter of New Zealand origin actually passed into consumption in Victoria.

CHEESE.

The production of cheese in this State continues to be carried on upon a fairly extensive scale, and because of the population of Queensland being less than that of either New South Wales or Victoria, which are the other principal centres of cheese production in the Commonwealth, it automatically follows that there is a proportionate curtailment in the aggregate amount of cheese disposed of in the local market here, and that this State has a goodly percentage of the total production of cheese available for exportation every normal season.

Queensland's Foremost Position.

Queensland occupies the foremost position in respect to the quantity of cheese exported each year, and it is not an unusual happening for Queensland to contribute three to four fold the amount of cheese exported each year by the remaining States of Australia.

Within the year something more than 15,000,000 lb. of cheese was produced, the production being approximately 3,500,000 lb. in excess of that for the former twelve months.

This branch of dairying has reached a stage where it is necessary that careful consideration should be given to the matter of deciding the lines upon which the future development of the industry is to be directed.

In the initiatory stages of the manufacture of cheese in this State it frequently happened that a cheese factory was erected in a somewhat isolated centre to serve the needs of the small dairymen in a community who otherwise would have experienced great difficulty in marketing the milk raised on their farms.

Erection and Equipment of Factories.

As is customary in the case of settlers in a new locality, there was a limit to the amount of capital available for expenditure in the erection and equipment of the cheese factory, and although elaborate buildings and plant were not within reach, the factories generally served the purpose intended of them, and laid the foundation of the cheese industry in this State. However, what was tolerably serviceable as factory, plant, and equipment ten or more years ago fails to meet the requirements of to-day, particularly as we have reached a stage where the principal proportion of the total amount of cheese manufactured is marketed in oversea countries, which incidentally means that the quality of the cheese must be of a standard sufficiently high to withstand the stress of the voyage across seas.

Necessity of Pasteurising Equipment for Cheese Factories.

In previous reports the necessity to add pasteurising plants to the equipment of cheese factories has been emphasised, and if manufacturers here desire to retain a footing for their cheese in oversea markets, it is obvious that they must specially cater for the requirements of such markets, and supply a commodity of the standard of quality suited to the popular taste of the consumers. This can be done by arranging for the pasteurisation of the milk under accredited methods prior to manufacture, but before it is practicable the installation of milk-pasteurising plants at many cheese factories is necessary.

It is granted that money is required in order to purchase and equip a factory with a pasteurising plant, but the expenditure involved is warranted, and amongst the principal advantages to be gained by so doing are (a) improvement in the standard of quality, (b) material increase in the yield of cheese, (c) the production of a cheese which will better stand the conditions of transit from factory to cold store and from cold store to oversea markets. The benefits accruing under the heading of either (a) or (b) are material, and either is individually sufficient to merit the installation of a pasteurising plant forthwith in every cheese factory in receipt of a reasonable quantity of milk.

By no means at our command, other than the general adoption of the principle of pasteurisation of milk for cheese purposes at factories, is it possible to bring about the improvement in the general standard of quality of the cheese output from factories, a matter which is so essential in order to place this particular branch of the dairy industry upon a satisfactory and permanent footing.

One of the principal companies engaged in the manufacture of cheese installed a milk pasteurising plant at the head factory during the year, and the results derived from its use have been sufficiently beneficial to encourage the company to extend the principle of pasteurisation to some of the branch factories in the immediate future.

For some years past the annual reports submitted have been strong in the advocacy of pasteurisation of milk at cheese factories, and as a consequence it is interesting to record that the results accruing from the application of the principle of pasteurisation of milk at a cheese factory in this State stand in substantiation of the claims voiced in favour of the method by this office.

There remains no longer a doubt whether the adoption of efficient pasteurisation of milk will, when applied here, be equally as advantageous as it has proven to be in other countries. Any hesitancy by factories in the installation of milk pasteurisers on that score is no longer warranted, and the experience so far is that, both in respect to theory and practice, the pasteurisation of milk is a sound proposition for cheese factories, and the equipment of the cheese factory is alike imperfect and inadequate unless a replete pasteurising plant is included.

HERD TESTING.

The practice of testing the dairy herds of individual dairy farmers that were submitted simultaneously in any district or locality was continued throughout the year.

The importance and value of herd testing to the industry generally and those engaged in it individually has been frequently emphasised, and the advantages to be gained by the submission of the herds in unrestricted numbers to a butter-fat test has been advocated from practically every quarter competent to advise upon the matter.

Test Results the Best Evidence of Worth.

Babcock test results are the only undeniable form of evidence of the worth of a cow as an agent for the production of butter-fat. To rely solely upon appearance in the selection of a dairy cow, assessing her merits as a producer in accord with the degree to which she appeals to the eye, or even to weigh her milk without also determining the butter-fat content of same, is frequently, if not always, a misleading plan, and in this connection it is significant to relate that no owner of an untested dairy herd has yet been successful in accurately indicating to the herd-testing officer, prior to herd-testing operations, the relative order of merit of the cows in his herd; and, what is even more convincing, in proclaiming herd-testing as the one reliable means whereby the productive capabilities of a dairy cow are to be determined, is the fact that to date no owner of a dairy herd has been successful in his selection of the animal yielding the most butter-fat in his herd immediately prior to the commencement of the testing operations. Consequently, it can be claimed that herd-testing provides the solution of what otherwise would remain a most difficult and intricate problem—that is, the accurate assessment of the relative merits and demerits of the respective cows in the dairy herds as producers of butter-fat.

Without doubt herd-testing should be more fully patronised by dairy farmers, as it really constitutes the keystone of economic dairy farming.

The Difference Between Profitable Work and Drudgery.

Other things being comparable, it follows that dairy farmers utilising dairy cows capable of the production of something less than 120 lb. of butter per annum cannot successfully compete with dairymen elsewhere whose herds yield equivalent to 300 lb. of butter each year. There exists a distinct difference between "drudgery" and profitable dairy farming, and the elimination from the herds of the unprofitable cows, whose presence is to be exposed by the adoption of systematic herd-testing, leads on to the latter goal, along what is the shortest and most certain route.

Particulars of the localities at which testing was carried out and the results of the testing of the dairy herds within the year, as contained in the report of the Herd-testing Officer, are given below.

Report of the Herd-Testing Officer.

During the first month of the year I was engaged in testing dairy herds on the Atherton Tableland, and although the season was not very favourable for big yields, a fair number of dairymen availed themselves of the opportunity, with the result that twenty-seven herds were submitted and 690 cows tested.

On returning to the South, herd-testing was continued in various districts without interruption until the month of May, when, owing to continued dry weather conditions, testing operations slackened off until rain improved conditions slightly, and work was continued throughout the remainder of the year. The centres in which I have operated during the course of the year are as follows:—Atherton (in the North); Greenwood, Bell, Rosewood district in the West Moreton; and Boonara Estate, Goomeri, and Mundubbera in the Burnett.

Satisfied Dairymen.

In Greenwood district tests were continued from last year, and when the fourth testing period was completed in November the dairymen interested decided to discontinue the tests for a season or more, expressing entire satisfaction with the scheme, and they intend at a later date to again apply to this Department for the services of a herd-testing officer. In September Ehlma and Brigalow to the west of Warra, also taking in a few herds from in the months of December, March, and June, a total of fifty-nine herds being submitted and 1,580 cows tested.

Seasonal Set-backs.

From Yelarbon, on the South-western Railway, an application came along in December, and a testing centre was formed there early in January, with the result that the largest number of herds of the season was submitted and 823 cows tested. Great enthusiasm was shown at the time, and it was arranged to have a second test carried out in April; but on arriving there the season had been so dry and severe that practically all the dairymen were reduced to milking once a day, and only two herds were submitted.

In Goomeri district two tests were carried out in November and February, but here again weather conditions interfered with any further tests being taken during the season.

Texas, situated about 30 miles from Inglewood, was visited during December, and 645 cows were submitted to the Babcock test. Unfortunately, when a retest was mentioned later on, no response was received, and therefore no further tests were carried out. In February twenty-three herds were submitted and 505 cows tested in Mundubbera district, but here again weather conditions interfered with further tests.

At the end of February a series of tests were commenced in the Rosewood district, and subsequent tests taken during April and June. The Testing Association there asked to have a test carried out every sixty days, and I certainly think this an improvement on the ninety days period, which has, up to the present, been the custom under the scheme of herd-testing.

Although the number of herds submitted in this district are not large, much good work has already been done, and it is anticipated that, as summer approaches, many more dairymen will join in the movement. The total number of herds submitted during the year was 278, comprising 6,916 cows.

Test Results.

The daily average yield of milk of all animals tested is shown as 17.5 lb., and the average butter-fat per cent. 4.1, while the average yield of commercial butter daily amounts to .84 lb. The highest herd average recorded is 1.30 lb. commercial butter. If we compare a herd with an average production of 1.30 lb. commercial butter with a herd producing the average—viz., .84 lb. commercial butter daily—taking the lactation as 300 days and both herds containing forty cows, the following figures are of interest:—40 cows of the better herd produce 15,600 lb. of butter, while 40 cows of the average produce 10,080 lb., a difference of 5,520 lb. Taking butter at 1s. 6d. per lb., the best herd returns £1,170, against £750 for the poorer herd, a difference of 54 per cent. in favour of the better herd. If it were possible to improve the dairy herds throughout Queensland to that level, it would mean, roughly, £4,000,000 sterling additional to the dairy farmers of Queensland. While this may not be possible for many years to come, it should not be a very difficult task to raise the average production of our dairy herds by 25 per cent. Assuming that there are 400,000 dairy cows in the State, this would mean an approximate gain of £1,900,000.

During the year sixty-eight samples of herd milks have been analysed for solids; also a large number of skim milks have been put through, which in many instances have shown that considerable losses occur during the operation of skimming—in one instance to the extent of 2½ lb. butter per day.

In most cases an improvement is generally made by more speed, higher temperature, or an addition of more dishes in the bowl of the separator.

As in the past, every opportunity has been given to dairy farmers to learn the method of testing milk and cream, and a fair amount of time has been given to this. During the present season I have been so busy that very few inspections of herds have been made, although in many instances I have been asked to go; but on account of so much actual testing it has been impossible.

As will be observed from the summaries attached, many farmers do not continue the testing, which is much to be regretted, as it is impossible to make any estimate of an animal's production unless at least three testings are carried out.

In regard to this I think the Department should try in some way to exact a promise from applicants that they will continue the tests for at least six months. This would also help the Department in arranging the work of testing for the officers engaged in this work.

PARTICULARS OF DISTRICTS WHEREIN TESTING OPERATIONS WERE CARRIED OUT.

District.	Month.	Number of Cows.	Average Daily Yield of Milk.	Average Fat per cent.	Average Daily Yield of Commercial Butter.
			Lb.		Lb.
Atherton	July	690	13.3	4.3	.67
Greenwood	August	257	22.1	4.0	1.02
Ditto	November	279	20.4	4.0	.94
Goomeri	ditto	681	19.0	3.88	.87
Ditto	February	489	19.2	4.0	.89
Texas	December	645	18.9	3.7	.82
Yelarbon	January	823	20.8	3.8	.92
Ditto	April	39	..	..	..
Mundubbera	February	505	18.5	4.0	.86
Burton	March	157	18.8	4.2	.92
Warra	September	382	20.8	3.9	.91
Ditto	December	507	18.2	3.75	.80
Ditto	March	506	18.9	4.0	.88
Ditto	June	185	12.6	4.6	.68
Rosewood	February	156	19.5	4.0	.90
Ditto	April	298	12.4	4.4	.64
Ditto	June	155	12.0	4.1	.57
Koonda-II	ditto	162	11.3	4.8	.64
Total .. .. .	.. .. .	6,916	..	..	..
Mean average .. .. .	.. .. .	..	17.5	4.1	.84

SUMMARY OF HERD-TESTING OPERATIONS.

Number of cows tested	6,916
Average daily yield of milk per cow	17.5 lb.
Average daily yield of commercial butter per cow .. .. .	.84 lb.
Average fat per cent. of all cows tested	4.1 %
Highest average yield of milk in a herd per diem	28.7 lb.
Lowest average yield of milk in a herd per diem	4 lb.
Highest average yield of commercial butter in a herd per diem	1.30 lb.
Lowest average yield of commercial butter in a herd per diem .. .. .	.28 lb.
Highest average fat per cent. in milk of a herd	6.1 %
Lowest average fat per cent. in milk of a herd	3.0 %
Highest yield of milk recorded for a cow per diem	45.5 lb.
Highest yield of commercial butter recorded for a cow per diem	2.18 lb.
Highest test recorded	7.9 %
Lowest test recorded	1.2 %

Technical Instruction.

The conveying of instruction to those engaged in the manufacture of dairy produce was continued throughout the year, and an increased number of requests were received for assistance in dealing with what may be regarded as the more intricate or technical phases connected with the manufacture of dairy products. The applications from factories were of particularly frequent occurrence during the warmer months of the summer, which is naturally the period wherein factories experience the most difficulty in the treatment of the milk or cream received from the dairy farms.

At present there are five dairy instructors engaged upon the dairy staff, but owing to the growing demand from factories for their services and the appreciable expansion of the industry which has taken place within recent years, the time is at hand when consideration must be given to the advisability of strengthening the number of dairy instructors somewhat.

Analyses.

A considerable number of samples of dairy produce, also water used for dairy factory purposes and ingredients employed in the manufacture of either butter or cheese, such as salt, rennet, preservative, artificial colouring matter, were submitted during the year to the Agricultural Chemist (Mr. J. C. Brünnich) for analysis, and the Government Bacteriologist (Mr. C. J. Pound) carried out the examination of many specimens of dairy products forwarded for bacteriological purposes by the Dairy Branch.

CONSERVATION OF FODDER.

No distinctive progress was made during the year in the matter of conservation of fodder in any of the accredited forms; consequently, as a result of the somewhat severe winter and with a decrease in the customary amount of the rainfall, coupled with an absence of ample supplies of fodders stored on the dairy farms in readiness to draw upon for the feeding of dairy stock, there occurred a noticeable shrinkage in the quantity of dairy produce raised during the winter period.

Insurance Against Shortage.

Dairy farmers will fail to enjoy the maximum return from their industry until such time as every dairymen conserves on his farm an ample supply of fodder to meet the requirements of his herd during every period of shortage in the supply of field pastures.

The conservation of fodder on an elaborate scale is something that cannot be achieved without the exertion of considerable effort on the part of owners of dairy herds, but there is no denying the advantages that are to be gained by the general adoption of a higher standard of animal husbandry.

The dairy farmer who conserves his fodder scores heavily during periods of dry weather over the man who does not practise the conservation of fodder. The former receives comparatively higher monetary returns from the factory for his produce; he reduces the risk of loss in his stock to a minimum, and immediately the season changes to normal his cows respond with an increased flow of milk, owing principally to the fact that their vigour had not been impaired by the temporary withholding of sufficient nutriment.

It appears that in the aggregate the advantages to be gained by fodder conservation are too great to sacrifice longer, and the way to overcome the difficulty is for every dairy farmer to conserve a supply of fodder on the farm, either in the form of ensilage or as hay in stacks, according to the kind of crop which may grow to best satisfaction in his particular locality.

THE BANANA BEETLE BORER—IV.*

By JOHN L. FROGGATT, B.Sc., of the State Entomological Staff.

Mr. Froggatt is specially investigating the history and habits of the Banana Beetle Borer, and subjoined is his fourth progress report which has been made available by the Minister for Agriculture and Stock (Hon. W. N. Gillies).

The following report covers the period August to December, 1922, during which the course of this research work was considerably interrupted through several causes. As assistance was not available, some lines of experimentation have not been able to be carried to such lengths as was anticipated. Observations on the habits and life history of the borer have been continued, and some fresh lines of investigation begun.

Those more directly interested in banana-growing are being more generally seized with the seriousness of the position as regards the menace of the banana beetle borer to the industry. During the last six months, further information, obtained on the distribution and depredations of this pest, shows it to be present in several parts previously thought to be clean. In one case reported, the plants were trying to throw bunches, but had only enough strength to partially develop half the first hand, and sometimes a few fingers on the second. The grubs of the beetle borer had completely riddled the butts, and had travelled 2 feet to 3 feet up the stems. Although speaking volumes for the vitality of the banana plant, it shows what havoc the borer will cause if allowed to run wild, and further, what a huge menace to the district such a plantation is.

THE EGG.

With imagos under observation, the rate of oviposition remained low throughout August; early in September, however, it increased most markedly and remained high until the middle of November, when it began to decrease again. From then, to the end of December, it has shown fluctuations, but has been below the average of September-October. The counts of the eggs, month by month, are given in Table A. A considerable increase in the activities of the beetles, in the field, was manifested in the first half of September, as compared with those pertaining in the previous month, thus corroborating laboratory observations.

These data, taken in conjunction with others previously obtained, appear to show that there are two periods in the year during which the activity of the beetles is infinitely greater than at other times—namely, March to the middle of May, and September to the middle of November (both inclusive); their activity appears to be greater in the summer than in the winter months.

Eggs laid in September matured in an average of 15 to 17 days; in October in 9.6 to 10.7 days; in November in 6.4 to 7.7 days; and in December in 6 days. Further details are given in Table B.

About twenty-four hours before the larva is ready to emerge, the jaws appear as two fine brown lines; then the palpi are to be seen, and later, the plates of the head. This gradual development is plainly visible through the egg envelope. When ready to emerge, the larva eats a hole in the covering, and by contracting and expanding the body, gradually draws itself out, at the same time working its way into the plant.

THE LARVA (OR GRUB).

The grubs have been largely bred in thin slices of corm, changed as required, in order that their development might be more closely studied. The rate of mortality amongst those transferred was exceedingly high, but sufficient were bred to enable definite data to be obtained. The larva casts its skin (or "moults") at least twice before reaching maturity; one took place 5 to 7 days, and, another, 20-24 days, after emergence; there are probably one or more moults between those cited.

The period for the larva to reach full development has been found to be from 55 to 60 days (eggs laid 4-12 September, 1922) to 27 to 33 days (eggs laid 3-6 November, 1922). Details of observations are given in Table C.

When the larva has finished feeding, it lies comatose in the end of the larval tunnel, the body becoming flaccid and elongated and the thoracic segments more prominent. This dormant period lasted for 2 to 3 days, when the larval skin was cast, leaving the pupa lying bare.

* No. 1, "Queensland Agricultural Journal," September, 1921, Vol. XVI., pp. 200-208.
No. 2, "Queensland Agricultural Journal," May, 1922, Vol. XVII., p. 240.
No. 3, "Queensland Agricultural Journal," October, 1922, Vol. XVII., p. 279.



PLATE 22.—INFESTED BANANA CORM, SHOWING GRUB TUNNELS.

THE PUPA (OR CHRYSLIS).

With larvæ pupating in September, the pupal period was 12 to 14 days; early in October it had decreased to 8 to 11 days; and in November-December the average was 6-7 days. Details are given in Table D.

From one to two days before the beetle is ready to emerge, a faint colouring of the joints of the legs is first noticed, and a little later, the plates of the head; this gradually spreads then deepens in tint until the whole body is a lemon, to light reddish-brown, which is the colour of the beetle on leaving the pupa.

In some cases a few fibres are found in the rear end of the pupal chamber; this is more generally found in old corms of a dry nature.

Records on the full life-cycle (from egg to emergence of beetle) gave 78 to 86 days for eggs laid 4-12 September, 1922, the period gradually decreasing to 41 to 44 days for those laid 3-6 November, 1922. Details are given in Table C.



PLATE 23.—BANANA CORM, SHOWING GRUB TUNNELS AND PUPA OF BANANA BEETLE BORER, IN SITU.

THE IMAGO (OR BEETLE).

The beetles lie dormant for 6 to 7 days before showing any marked inclination to move about, by which time they are a very dark reddish-brown in colour. They do **not** become fully coloured for about 14 to 15 days (average) after emergence, and often take longer than this.

The rate of mortality amongst the newly-emerged beetles bred in the laboratory was very high. Field observations, to check this under natural conditions, were not practicable.

Continued observations on the longevity of the imagos have shown that feeding on banana corm they live 474 to 489 days; in this case the beetles were collected in a plantation on 11-18 May, 1921, and died out 4-12 September, 1922. Imagos bred from pupæ, collected in the field and fed on corm, lived for a maximum period of 471 to 488 days. Details of the results of these observations are given in Table E.

Progressive results (in percentages) of the total number of beetles alive in this series are shown in Table F.

In moist or damp soil, the beetles will live without food for some time, but kept under by dry conditions they die rapidly.

Tests on the poisoning of corm baits have been continued, but owing to a continued scarcity in the number of beetles to hand, and numerous interruptions affecting the essential continuity of procedure, this work could not be carried to the degree of finality that was anticipated. A number of tests were made with borax as the active principle. Over long periods of exposure to the treated corm, this chemical was found to be extremely deadly on the beetles, but over shorter periods, such as would normally be the case under field conditions, it was not nearly so effective. No test, so far, has given results comparable with those obtained with either "Paris green" or arsenite of soda, used as dry powders. (*Vide* Banana Beetle Borer III., "Agricultural Journal," October, 1922.)

Experiments have been made in both the laboratory and the field to ascertain the powers of flight, if any, of the imagoes. In order to prevent them crawling away, a kerosene tin was cut down and filled with water: the beetles were placed in a tin lid, without corm, on a float, moored in the centre of the tin. These tests were started, both in the morning, and late afternoon, during October, November, and December. In no case did beetles get across the water. Further series of tests, on this function of the adult, will be carried out at a later date.

Where beetles are exposed to heat, in such a way that they are unable to crawl from it, they roll on to their backs, and after waving their legs in the air for a few seconds, die. The heat of the sun on a tin lid is sufficient to give this result. In no case have they been observed to even attempt to expand their wings.

It has been stated that the beetles can be drowned by submergence in water. In order to test this, a given number of beetles were taken in each of five lots, one, acting as a control, with the beetles feeding on corm over damp earth; in the other four, no corm was placed. In No. 1 the earth was damp, in No. 2 it was wet, and in No. 3 it was waterlogged. In No. 4 the beetles were submerged in ordinary tap water. In Nos. 1, 2, and 3, the beetles were buried in the soil. After a period of ninety-six hours' immersion, 90 per cent. were removed alive from these lots and, feeding on corm, were still alive ten days later. It, therefore, does not seem at all likely that it would be practicable either to drown the beetles out of a plantation, or, even kill them by immersing infested suckers in water. It should be stated that the jars, in which the tests were made, were exposed to ordinary room temperature throughout the course of each series.

Preliminary tests have been made with Paradichlorobenzine in order to ascertain its action on the beetle borer when added to the soil.

Laboratory experiments have shown that, when a few grains of the chemical are sprinkled on the bottom of a tin, and covered with 4 inches of soil, beetles, being buried 3 inches below the surface, they appear on top of the soil within two to three hours, whereas, under similar conditions without the chemical, they do not show up within at least eight hours. It thus drives them out from a confined area. The odour was quite noticeable in the soil for more than a fortnight after being treated. In a closed space, its vapours are exceedingly deadly on both the grubs and the beetles. Field tests with this compound have not yet been carried far enough to enable conclusions to be drawn from them.

There is no doubt whatsoever, but that the most important factor in laying out a plantation, in relation to this pest, is to start with clean suckers. There is far too great a spirit of laxity over this matter, although more attention is now being paid to it than heretofore. It is not sufficient to see a plantation looking healthy and in other ways prosperous, to say that it is free from beetle borer. It may be present to a very slight extent, even in only a few stools. A careful examination should be made before taking suckers from any plantation, particular attention being paid to old stems and butts; if the pest is present, the grub tunnels will be found. Even if the plantation appears to be free, make doubly sure of obtaining clean suckers by never allowing the suckers to lie on the ground, overnight, in the plantation; or, in other words, do not dig any more suckers than can be carted away that same day.

As no new advice can be given on remedial measures, it is unnecessary to reiterate what has been published before on it.

Statements have been made that small red ants destroy a considerable number of the grubs of the beetle borer. In order to do this, they must first gain entrance to the tunnels in the corm. During the last twelve months, a careful watch has been kept, in a large number of plantations for any occurrence of ants in banana corms. In old bulbs, where the beetles emerging had left openings onto the surface, ants

have been found nesting, often in considerable numbers, in old disused tunnels. In the new workings, where the grubs were, however, they have never yet been seen. It was not expected that they would be, because the grubs pack up the tunnels so tightly behind them with their sawdust-like excreta, that the ants are unable to reach them.



PLATE 24.—GRUB PUPA, AND ADULT OF
BEETLE BORER.
(Natural size.)

Owing to numerous inquiries having been made as to what the beetle is like, &c., it is thought advisable to add a few brief notes on the various stages.

The eggs are small white objects, about one-twelfth of an inch long; they are laid singly in small burrows, lying just under the surface of the plant, at about ground-level.

The grub, on emerging from the egg, begins to tunnel its way into the plant, packing up the space behind with sawdust-like excreta. When fully developed, it comes to rest close to the surface of the bulb and turns into the pupa. When full-grown, it is about half an inch long, the body creamy white with the head reddish-brown. It is in this stage that the borer does the damage to the plants, the grubs devouring an enormous amount of plant material.

The pupa (or chrysalis) is slightly under half an inch in length; it is creamy white and shows the outlines of the beetle. This is a quiescent stage.

The beetle is slightly less than half an inch long and jet black in colour. It has a long, slightly-curved trunk, in front of the head. It is extremely sluggish, and pretends to be dead when disturbed.

In conclusion, the writer wishes to express his indebtedness to Messrs. Brünlich (Chemist's Branch) and Coleman (Pure Seeds Branch) for supplying samples of Paradichlorobenzine for experimental purposes.

SUMMARY OF CONCLUSIONS.

I. Development and deposition of eggs is at its maximum in spring and autumn, decreasing most markedly in summer and winter.

II. The imagos, feeding on corm, have lived for more than seventeen lunar months in captivity.

III. The beetles can survive an immersion in water, at room temperature, of ninety-six hours' duration.

IV. Tests on the powers of flight of the imagos have, so far, given negative results.

V. Para-dichlorobenzine, in laboratory tests, has shown strong toxic properties on the beetles in a confined space.

VI. Care in obtaining suckers free from the pest cannot be too strongly emphasised.

EXPLANATION OF PLATES.

No. 1. Section of Banana Corm, showing Grub Tunnels and Nature of Injury.

No. 2. Pupa of Banana Beetle Borer in situ.

No. 3. Larvae, Pupae, and Imagos of Banana Beetle Borer.

TABLE A.

Lot. (Refer to Table F).	Eggs Laid to 31st July, 1922.	EGGS LAID FOR MONTHS OF—					Total Eggs Laid to 23rd December, 1922, in the Lots.
		August, 1922.	September, 1922.	October, 1922.	November, 1922.	December to 23rd inst.	
*E	55	0	..	..	..	..	55
F	507	0	..	..	..	..	507
G	2,084	0	0	..	..	..	2,084
H	62	0	..	..	..	..	62
I	1,653	1	0	..	..	..	1,654
J	559	1	7	0	..	..	567
K	697	0	0	0	..	..	697
L	435	0	..	..	..	..	435
T	191	0	25	31	11	0	258
U	16	0	0	..	..	..	16
V	87	4	0	..	..	..	91
*W	3	2	1	3	7	..	16
X	2	6	159	322	151	71	711
Y	..	1	163	412	189	116	881
Z	..	..	30	361	223	85	699
1	..	..	..	147	140	22	309
2	..	..	..	120	120	20	260
3	..	..	..	..	99	111	210
4	..	..	..	..	..	210	210
5	..	..	..	..	..	0	0
Totals	6,351	15	385	1,396	940	635	9,722

TABLE B.

Eggs Laid.	Days to Showing of First Sign of Mandibles.	Days Thence to Emergence of First Larva.	Days for Total Emergence.
28/8/22 to 29/9/22	9.5-15.8 (Max. 14-21) (Min. 7-11)	2.4	15-17 (Max. 19-26) (Min. 13-14)
29/9/22 to 30/10/22 ..	7-8 (Max. 9) (Min. 6)	1	9.6-10.7 (Max. 11-13) (Min. 8-9)
30/10/22 to 27/11/22 ..	5.6 (Max. 7) (Min. 5)	1	6.4-7.7 (Max. 7-9) (Min. 6-7)
27/11/22 to 20/12/22 ..	5	1	6 (Max. 6-7) (Min. 5-6)

TABLE C.

Eggs Laid.	Egg Period in Days.	Larval Period in Days.	Pupal Period in Days.	Full Life Cycle in Days.
4-12/9/22	18-21	55-60	5 (Min.)	78-86
13-19/9/22	19-20	48-49	7	69-76
18-22/9/22	14-15	55-58		69-73
19-26/9/22	18-20	41-42	6	60-68
22/9/22-12/10/22	11-2-12-8	42-6-47-2	6-6-7-8	59-2-65-4
12-27/10/22	7-5-10	36-39-7	6-5-7-7	52-5-56
27/10/22-3/11/22	5-5-9	33-34-5	5-6	44-5-49
3-6/11/22	6-8	27-33	5-6	41-44

TABLE D.

Larva Dormant.	Larva Pupated.	Pupa Coloured.	Imago Emerg.	Dormant Period in Days.	Days from Colouring to Emergence.	Pupal Period in Days.
..	16-18/9/22	29-30/9/22	30-9/22 to 1/10/22	..	1-2	13-14
18/9/22	23-25/9/22	4-5/10/22	6-7/10/22	5-7	2	12-13
30/9/22	3-4/10/22		13-14/10/22	3-4	..	9-11
9/10/22	11-12/10/22	18-19/10/22	20-21/10/22	2-3	2	8-10
16/10/22	16-17/10/22	23/10/22	25/10/22	..	2	8-9
13/11/22	15-16/11/22	20/11/22	22-23/11/22	2-3	2-3	7
10/11/22	11-13/11/22		19/11/22	1-3	..	6-8
20/11/22	20-21/11/22	25-27/11/22	27-28/11/22	..	1-2	7
24/11/22	26-27/11/22	30/11/22 to 3/12/22	2-4/12/22	2-3	1-2	5-7 (av.)
29/11/22	30/11/22	4-5/12/22	6-7/12/22	1	2	6-7
1/12/22	3/12/22	8-9/12/22	10-11/12/22	2	1-2	7-8 (av.)
4/12/22	5-11/12/22	10-15/12/22	11-17-12/22	1	2-3	7-8 (av.)
7/12/22	7-11/12/22	13-15/12/22	14-17/12/22	1-2	1-2	6-8 (av.)
8/12/22	9-10/12/22	14/12/22	15-16-12/22	1-2	1-2	6
11/12/22	11-13/12/22	16-17/12/22	17-18/12/22	1	1	5-6
11-14/12/22	14-15/12/22	20/12/22	21-22/12/22	1	1-2	7

TABLE E.

Collected or Bred.	Lot. (See Table F.)	Dates of Collection or Breeding.	Dates of Last Death.	Life in Days.	Life in Terms of Lunar Months, &c.
Bred ..	E	24-27/4/21	1-15/8/22	471-488	16 months 3 weeks and 2 days to 17 months 1 week and 5 days
Collected ..	F	29/4/21 to 5/5/21	25/7/22 to 1/8/22	454-461	15 months 3 weeks and 5 days to 16 months 1 week and 4 days
Collected ..	G	11-18/5/21	4-12/9/22	474-489	16 months 3 weeks and 5 days to 17 months 1 week and 6 days
Collected ..	H	24/5/21	21-28/8/22	454-461	16 months and 6 days to 16 months 1 week and 6 days
Collected ..	I	28/5/21 to 4/6/21	18-22/9/22	478-482	17 months and 2 days to 17 months and 6 days
Collected ..	J	18/7/21	6-10/10/22	445-449	15 months 3 weeks and 4 days to 16 months and 1 day
Collected ..	K	1/8/21	29/9/22 to 3/10/22	424-428	15 months and 4 days to 15 months 1 week and 1 day
Collected ..	L	2-15/9/21	1-15/8/22	320-347	11 months 1 week and 5 days to 12 months 1 week and 4 days
Collected ..	T	21-24/2/22	4-8/12/22	283-290	10 months and 3 days to 10 months 1 week and 3 days
Collected ..	U	14-15/3/22	4-12/9/22	172-181	6 months and 4 days to 6 months 1 week and 4 days
Collected ..	V	10-11/5/22	25-29/9/22	108-203	7 months and 2 days to 7 months and 1 week
Bred ..	W	16-20/4/22	27/11/22 to 1/12/22	221-224	7 months 3 weeks and 4 days to 8 months

TABLE F.

Lot.	*E.	G.	H.	I.	J.	K.	L.	T.	U	V	*W.	X.	Y.	Z.	1	2	3	4	*5
Date Collected or Bred.	24-27/4/21.	11-18/5/21.	24/5/21.	28/5/21 to 4/6/21.	18/7/21.	1/8/21.	2-15/9/21.	21-24/2/22.	14-15/3/22.	10-11/5/22.	16-20/4/22.	20-21/7/22.	1-12/8/22.	1-16/9/22.	13/10/22.	18/10/22.	7-8/11/22.	27-30/11/22.	1-4/12/22.
No. Collected.	16	379	26	324	85	119	72	50	16	190	9	144	90	150	58	50	270	100	7
Alive on—	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
1/8/22 ..	6.8	15.0	3.9	11.1	4.7	8	1.4	22.0	12.5	89.5	77.8	95.8	..	..	..	..	..	..	..
15/8/22 ..	..	7.1	3.9	8.7	4.7	8	..	16.0	6.3	87.9	55.6	95.8	100.0	..	..	..	..	..	..
28/8/22 ..	..	3.2	..	5.6	4.7	8	..	12.0	6.3	78.9	44.4	94.5	98.9	..	..	..	..	..	..
12/9/22 ..	..	..	..	1.2	2.3	8	..	10.0	..	2.1	44.4	93.8	96.7	..	..	..	..	..	..
22/9/22 ..	..	..	..	..	2.3	8	..	10.0	..	1.1	44.4	92.4	93.3	100.0	..	..	..	..	..
29/9/22 ..	..	..	..	..	1.1	8	..	10.0	..	..	33.3	92.4	91.1	100.0	..	..	..	..	..
3/10/22 ..	..	..	..	..	1.1	..	..	10.0	..	..	22.2	91.7	87.7	100.0	..	..	..	..	..
10/10/22 ..	..	..	..	..	..	..	..	10.0	..	..	22.2	90.3	86.7	100.0	..	..	..	..	..
16/10/22 ..	..	..	..	..	..	..	..	6.0	..	..	22.2	90.3	85.6	100.0	100.0	..	..	..	..
23/10/22 ..	..	..	..	..	..	..	..	4.0	..	..	11.1	87.5	83.3	99.3	93.1	100.0	..	..	..
10/11/22 ..	..	..	..	..	..	..	..	1.0	..	..	11.1	77.8	76.7	96.0	87.8	98.0	100.0	..	..
1/12/22 ..	..	..	..	..	..	..	..	1.0	..	..	..	65.2	68.9	90.7	81.0	92.0	95.2	..	..
8/12/22 ..	..	..	..	..	..	..	..	..	..	..	..	64.6	66.7	89.3	81.0	86.0	94.1	99.0	100.0
15/12/22 ..	..	..	..	..	..	..	..	..	..	..	..	60.4	60.0	86.0	75.8	80.0	92.9	99.0	100.0
30/12/22 ..	..	..	..	..	..	..	..	..	..	..	..	52.8	53.3	83.3	70.6	74.0	89.6	96.0	100.0

A SUMMARY OF SOME EXPERIMENTS CARRIED OUT BY THE BUREAU OF SUGAR EXPERIMENT STATIONS—VI.

By H. T. EASTERBY, Director.

The first article of this series, in the course of which Mr. Easterby discussed deep cultivation experiments and tabulated comparative crop results from subsoiled and non-subsoiled fields, was published in the May (1922) Journal. The second instalment, an account of the results of irrigation experiments and the action of irrigation and manures upon the density and purity of sugar juices, appeared in the June (1922) issue. The third instalment, treating of experiments in fertilisation, was published in the August number. The September issue contained an account of distance experiments and resultant crops. In the October Journal, Mr. Easterby continued his summary with notes on the introduction and testing of cane varieties and the testing of certain varieties of cane at Mackay.—Ed.

Experiments to Determine if Cane Sets Cut from Arrowed Canes have a Prejudicial Effect on the Germination and Subsequent Yield.

It has been frequently stated that cane planted from arrowed sets resulted in a poorer strike and a lower tonnage of cane per acre. No definite information upon this point exists in Queensland, and it is usual to advise the planting of non-arrowed sets where possible. In order that reliable data upon the question might be secured, an experiment was laid down at the Mackay station in a most careful and accurate manner. An absolutely uniform piece of land was chosen and carefully prepared.

The plants were selected from a field of cane of the variety known as Q. 116. This was all of the same age, but some had arrowed while other portions had not. Care was taken to choose canes for plants under both these conditions that were as like each other as possible in all details except arrowing. The same number of three-eye plants were placed in every drill.

Great care was taken in the planting, each one being carefully inspected before placing in the drill, so that every precaution might be taken that none of the eyes were in any way damaged. The germination was most carefully noted every week during the early period of growth, every shoot showing in both plots being counted.

Early in December, whilst the process of stooling out was in progress, a further count of every shoot above ground was made.

The cane in both plots grew exceedingly well and made a fine stand. From the counts at the times abovementioned, the following table has been compiled:—

DETAILS OF GERMINATION IN THE ARROWED AND NON-ARROWED PLANT EXPERIMENT.—PLANT CROP 1914.

Number of Plot.	Variety of Cane.	Date of Planting.	Total Number of Eyes Planted.	Plants Cut from—	Date of First Germination.	Shoots Showing on 4th Sept.	Shoots Showing on 11th Sept.	Shoots Showing on 18th Sept.	Shoots Showing on 25th Sept.	Shoots Showing on 2nd Oct.
1	Queensland 116	1913. 5 Aug.	528	Arrowed Cane	1913. 28 Aug.	87	148	190	214	232
2	Queensland 116	5 Aug.	528	Non-arrowed Cane	25 Aug.	122	178	238	287	306



PLATE 25.—SUGAR EXPERIMENT STATION, GORDONVALE, N.Q.

DETAILS OF GROWTH IN THE ARROWED AND NON-ARROWED PLANT EXPERIMENT—
PLANT CROP, 1914.

No. of Plot.	Variety of Cane.	Date of Planting.	Total No. of Eyes Planted.	Plants Cut from—	No. of Shoots Showing on 9th October, 1913.	No. of Shoots showing on 1st December, 1913.	Actual Count of Cane on 1st August, 1914.
1	Queensland 116	5 Aug., 1913	528	Arrowed cane	260	748	770
2	Queensland 116	5 Aug., 1913	528	Non-arrowed cane	335	888	777

From the above tables it will be seen that the non-arrowed cane sets assumed the lead, which was maintained right up to August, 1914, but it is noteworthy that the big lead in the beginning was reduced to almost equal numbers by that date, and the arrowed cane finally produced almost as many sticks as that planted from non-arrowed cane.

Summary of Crop Results.

TOTAL CROP RESULTS TO DATE OF CANE IN THE ARROWED AND NON-ARROWED
PLANT EXPERIMENT—PLANT AND FIRST RATOON CROPS, 1914-1915.

Number of Plot.	Variety of Cane.	Plants Cut from—	PLANT CROP, 1914.		FIRST RATOON CROP.		TOTAL YIELD— TWO CROPS.	
			Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.
1	Queensland Seedling 116	Arrowed Cane ..	55.5	8.2	29.7	4.9	85.2	13.1
2	Queensland Seedling 116	Non-arrowed Cane	51.9	8.0	27.3	4.5	79.2	12.5

The above table shows that the yield from the cane where arrowed cane was used for planting gave a higher yield in the case where the plants were cut from non-arrowed cane.

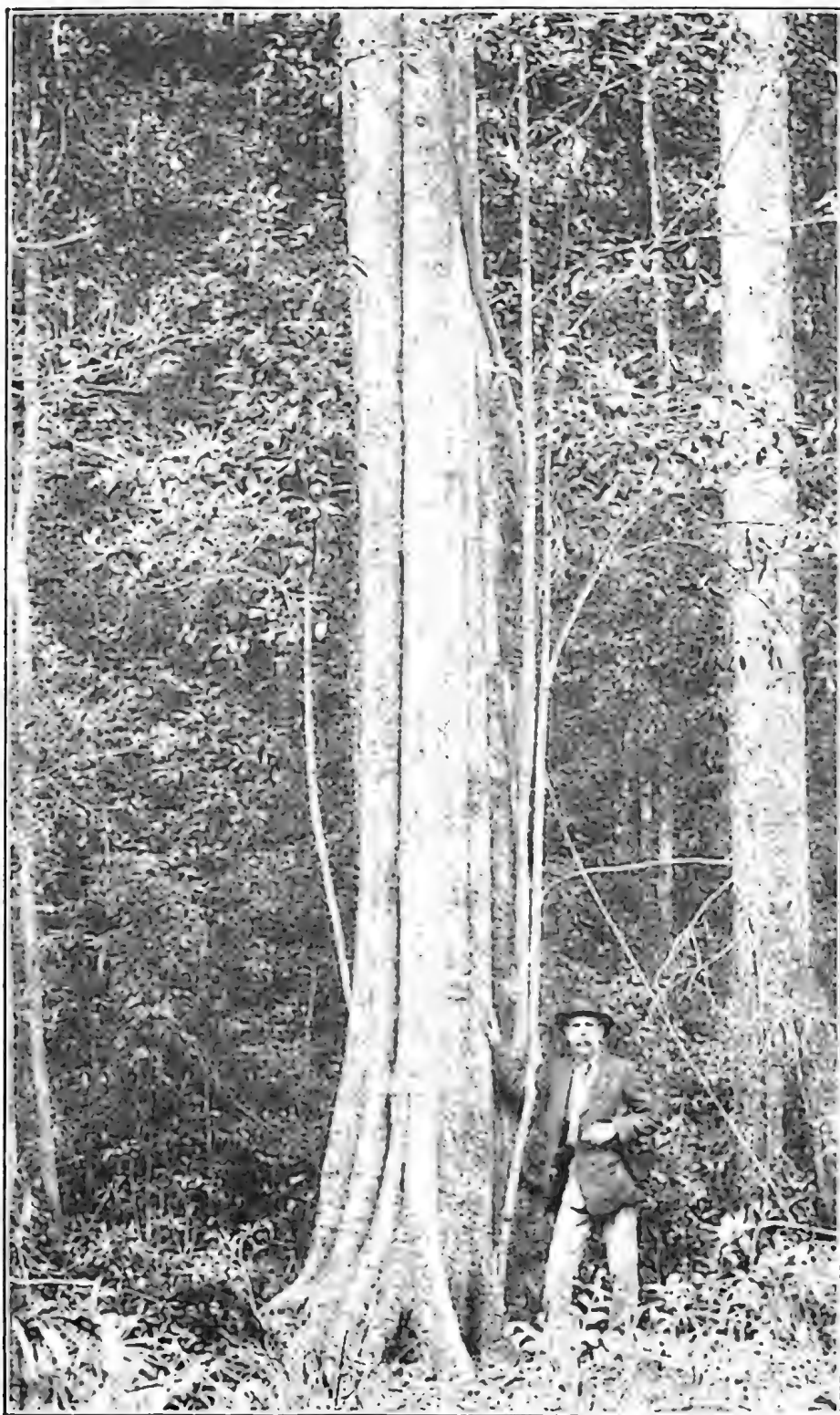
QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS,
Assistant Botanist.

No. 17.

THE BLACK APPLE OR BLACK PLUM (*Sideroxylon australis*).

Its large bluish-black fruit has made this species fairly well known, especially in the temperate coastal parts of New South Wales, such as Illawarra. There is a purplish-black dye in the "skin" of the fruit, and the large, very hard, glossy seeds when pierced at the ends are sometimes made into necklaces or other ornaments by children. The trees attain a height of 100 feet and a barrel diameter of 2 feet. The large tree shown in the picture illustrates the typical form of the species. The channels or grooves in the barrel are very often seen in the trees. In common with other species of *Sideroxylon*, the bark and green parts of the Black Apple when cut or bruised exude a milky juice, but in some cases we have noticed that the exudation of the latex from the green parts is scanty. The tree is found in the rain forests of Eastern Australia, from Illawarra, New South Wales, to Rockingham Bay, North Queensland.



Photo, by W. D. Francis.]

PLATE 26.—THE BLACK APPLE OR BLACK PLUM (*Sideroxylon australis*).
A tree on Tambourine Mountain.

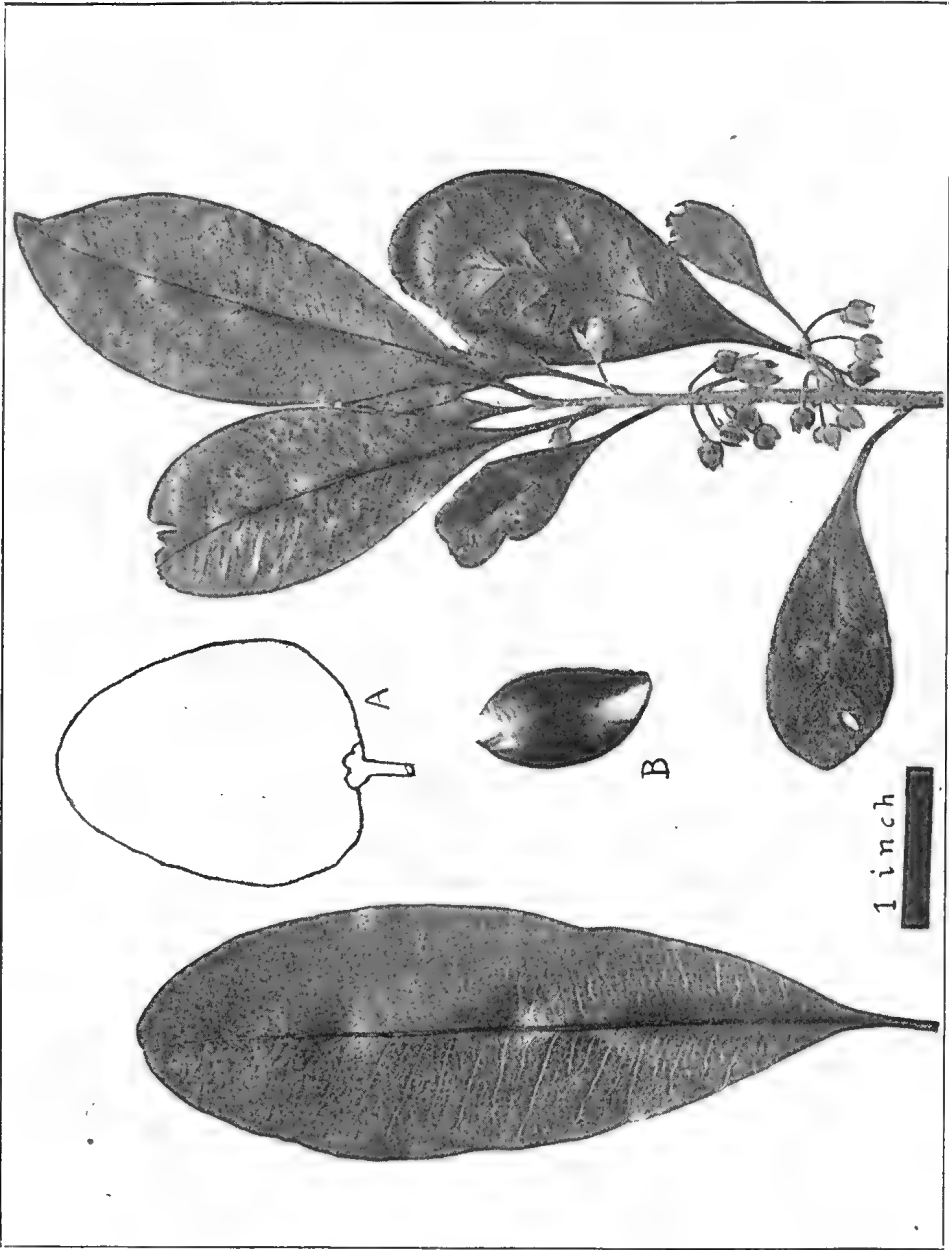


Photo by Dept. Agriculture and Stock.]
PLATE 27.—BLACK APPLE OR BLACK PLUM.
A.—Diagram of fruit, slightly reduced. B.—A seed.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS FOR DECEMBER, 1922.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Pretty Maid of Haremar	Ayrshire ...	11 Sept., 1922	960	3·7	41·40	
Bellona ...	" ...	30 Aug., "	900	3·8	39·90	
College Meadow Sweet	Friesian ...	18 Sept., "	930	3·6	39·00	
Thyra of Myrtleview	Ayrshire ...	22 Aug., "	810	4·0	37·80	
College Mignon ...	Jersey ..	22 Nov., "	660	4·8	37·20	
Confidence... ..	Ayrshire ...	13 Aug., "	750	3·8	33·30	
Hedges Nattie ...	Friesian ...	20 May, "	660	4·2	32·40	
Yarraview Snowdrop	Guernsey ...	1 Sept., "	540	4·9	31·20	
College La Cigale	Jersey ...	10 July, "	420	5·9	29·10	
Songstress ...	Ayrshire ...	4 July, "	630	3·9	28·80	
Miss Fearless ...	" ...	30 May, "	630	3·9	28·80	
Dawn of Warragaburra	Jersey ...	17 May, "	540	4·5	28·50	
Wattle Blossom ...	Guernsey ...	8 Sept., "	540	4·2	26·70	
La Hurette Hope	Jersey ...	30 June, "	420	4·9	24·30	
Dear Lassie ...	Ayrshire ...	19 June, "	540	3·8	24·00	
Netherton Belle ...	" ...	19 July, "	450	4·3	22·50	
Miss Betty ...	Jersey ...	15 May, "	360	5·1	21·60	
College St. Margaret	" ...	16 June, "	330	5·5	21·30	
College Bluebell ...	" ...	22 Oct., "	390	4·7	21·30	
Hedges Dutchmaid	Friesian ...	23 Sept., "	540	3·3	20·70	

Rainfall for the Month, 313 points.

WEEDS OF QUEENSLAND.

By C. T. WHITE, Government Botanist.

No. 29.

THE PEACH LEAF POISON BUSH OR WILD PEACH (*Trema aspera*).

Description.—A shrub or small tree, branchlets clothed with rather soft hairs. Leaves usually 2-3 inches long and about $\frac{3}{4}$ -1 inch broad, borne on stalks of 3-4 lines, the base more or less rounded, the apex tapering into a rather slender point. Upper surface rough, with short rigid hairs, under surface velvet-hairy, edges serrate. Flowers small, borne in short bunches (cymes) in the axils of the leaves. Fruit black, ovoid or globose, 1-2 lines in diameter.

Distribution.—A very common plant of Northern and Eastern Australia, often comes up very thickly as secondary growth on "scrub" farms.

Botanical Name.—*Trema* from the Greek *trema*, a hole (the hard bony covering (endocarp) of the seed is rough and pitted with holes); *aspera*, Latin, meaning rough, referring to the roughness of the upper surface of the leaf.

Poisonous Properties.—*Trema aspera*—variously known as Wild Peach, Poison Peach, or Peach Leaf Poison Bush—is commonly regarded as one of our worst poisonous plants, and there are numerous references to it as a plant reputed poisonous to stock in the writings of Australian botanists. It has been held by some that the harmful effects attributed to the plant were due to its tough and indigestible nature, when ingested by stock in the absence of softer and more palatable feed, as the plant belonged to a family of plants, the Ulmaceæ, the members of which as a general rule are quite wholesome.

In the proceedings of the Royal Society of Queensland (vol. 32, No. 11) Mr. F. Smith, B.Sc., and the writer, published a paper showing that at times the plant produced a prussic-acid-yielding glucoside, and at such times, if eaten in quantity, especially by hungry stock, might cause death. The presence of this glucoside in quantity would, on the whole, fortunately, appear to be rare, and what controls its formation is impossible on our present knowledge to say.

I have often noticed Wild Peach to be eaten freely by stock without ill effects following, and W. D. Francis, writing in this Journal (vol. XII., n.s., p. 30), stated that the weed was extensively eaten by cattle in the Kin Kin district during drought periods, but that it was the cause of very few if any losses in the district. My personal opinion is that Wild Peach, though at times definitely poisonous, has on the whole been very much overrated as a stock poison.

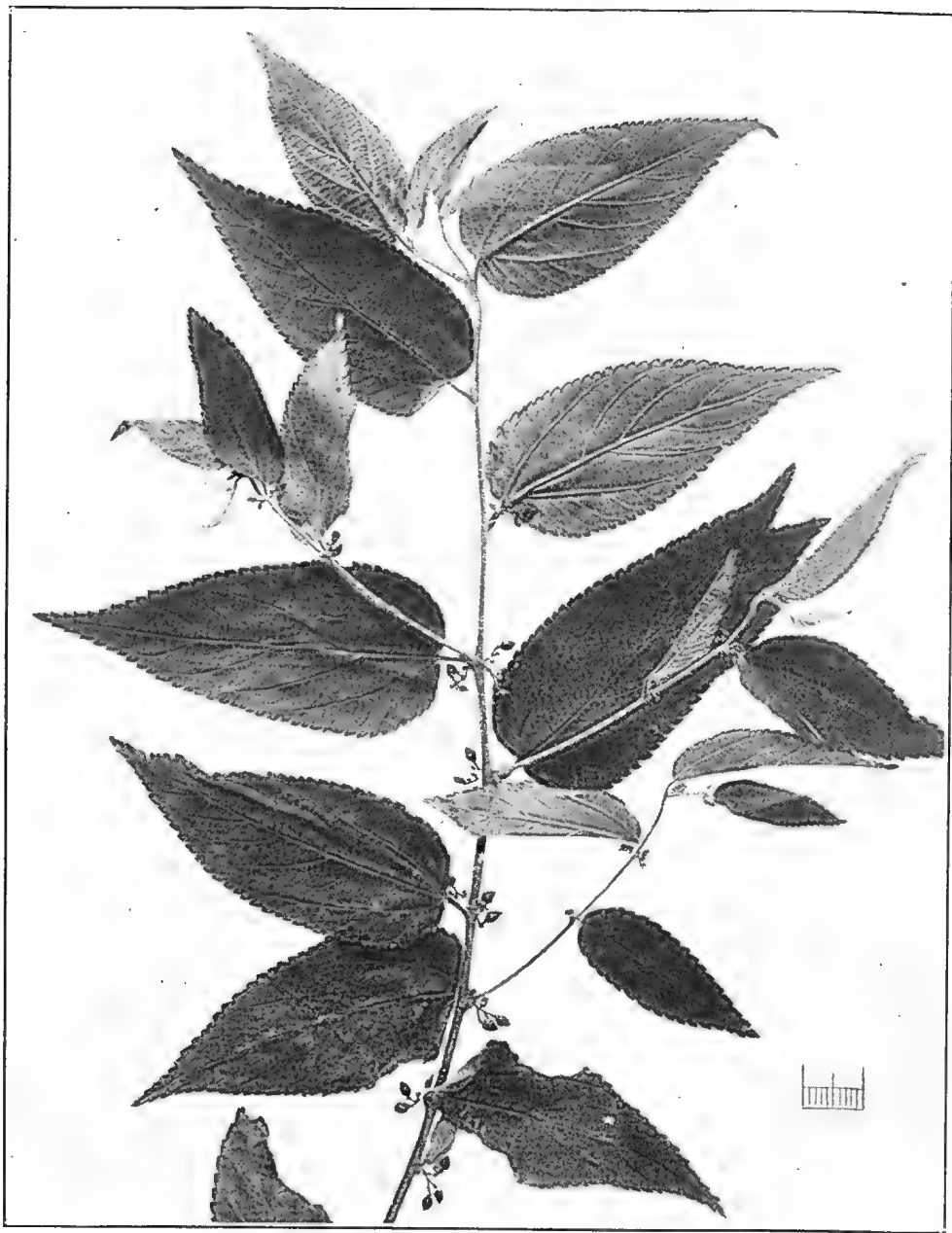


PLATE 28.—*TREMA ASPERA*
(Wild Peach or Peach-leaf Poison Bush).
(About natural size.)

STOMACH WORMS (*STRONGYLUS CONTORTUS*) IN SHEEP.

By W. G. BROWN, Sheep and Wool Expert.

This is a pest which yearly is increasing in virulence in districts where it has been long established, and what is most serious is invading districts hitherto free from its ravages.

Like the prickly-pear, its approaches are slow, and almost unnoticed, but when fully entrenched, it will take years to eradicate, and in the meantime do enormous damage to the flocks.

For many years it was believed that the warm and normally dry areas of Western Queensland would always be exempt because of the heat and dryness, but time has shown that these places in the West are as badly infested as any district in Queensland.

Direct losses amongst the young stock must be very great, and the damage does not cease there, for those which survive are stunted and debilitated. Thus they become an easy prey to starvation, blowflies, &c.

The object of this article is to show that the pest can be dealt with and, in time, eradicated. This opinion is founded on knowledge of the life history of the worm, experiences of other parts of the world, and personal experience in Australia.

SCOPE OF ARTICLE.

- 1st. The life history of the parasite.
- 2nd. Theories in regard to infestation of country.
- 3rd. The various measures taken to combat the pest.
- 4th. Summary and recommendation.

The Life History of the Stomach Worm.

If the life history of a parasite be fully known, it is certain that soon or late it can at least be controlled. The history of this particular pest is very well known. It has been investigated by many well-known helminthologists, and all are agreed. Given shortly, it is this:—

The female worms lay their eggs in the stomach of the animal. These eggs pass out of the body in the excreta. They contain living embryos, which, when suitable conditions of warmth and moisture arise, undergo further development. They hatch out in periods, varying according to temperature, high or low, from two hours to three or four weeks. If the temperature be below 40 degrees Fahrenheit the eggs remain dormant, and can remain in that condition for two or three months, and afterwards hatch out when the weather becomes warmer. The young worm feeds on the organic matter contained in the droppings, and grows until it is one-thirtieth of an inch in length. No further growth takes place until a suitable host has swallowed it, and, as it climbs to the top of the grass blades this is very probable. After being swallowed it matures in the fourth stomach of ruminants (cattle, sheep, or goats) in from two to three weeks.

Before the worm has reached the final stage it does not easily withstand the influence of cold or dryness, but when the so-called ensheathed form is reached, it is endowed with longevity, and grows into the adult stage in the stomach when taken up by a sheep. Such ensheathed larvæ have been found alive six months and longer (Dr. Arnold Theiler, C.M.G., Director of Veterinary Research, S. Africa).

INFESTATION OF ANIMALS.

One thing appears to be quite certain—there is no such thing as “wormy” country. Worms do not appear spontaneously anywhere, and they are not a special creation. They must be carried and deposited by a ruminant. If wheat be sown, wheat will grow. If worms be sown, worms will be produced.

There are only two ways by which infestation of animals and land can be caused—

- (a) By introducing infected stock on clean land.
- (b) By placing clean stock on infected land.

Thus the question of control and eradication resolves itself into two methods, which are not impracticable in our case—

- (a) Cleaning infected land before allowing ruminants to graze on it; and
- (b) Cleaning infected sheep before allowing them to graze on clean land.

CLEANING INFECTED LAND.

Quoting Dr. Theiler again, he says—

"The facts which come out of the foregoing notes indicate that as long as sheep graze over pastures which are infected with wire-worms, so long will they be reinfected, particularly when the climatic conditions—warmth and moisture—are favourable for the exit of the worm from the eggs, and for development to the ensheathed stage. Accordingly it must be our endeavour to free a pasture from infection. This can only be done by starving the young worms out, which, as has been shown, will occur within a year, when no proper hosts (*i.e.*, all ruminants) are grazing over the same veld. A farmer must, in the first place, make arrangements that he always has some pasture at his disposal over which no ruminants have been grazing for nine months to one year, so that he can turn his sheep on to such veld as soon as they show worm infection. Before doing so, however, he must take the second important step—*viz.*, to clean his sheep from worms by collecting his sheep into a kraal to dose them.

"It must be stated here that even the best medicine does not kill all the worms in all sheep, there are always some parasites which escape. Accordingly, a clean pasture will in time become reinfected, particularly in a warm and moist season. It is here that a sheep farmer will be able to show his skill in handling his flock, so that during these periods they never remain on the same pasture, but are changed systematically on to the same veld. When infection becomes too strong again, a new dosing and another change on to clean veld is necessary, the infected land to be kept free from ruminants. In adopting this system of dosing and moving on to clean ground, it will be possible after the lapse of a certain time to free, comparatively speaking, both the pasture and sheep from worms, or at least to so reduce them in number that the worms can easily be kept in check.

"There are additional measures which help to reduce the infection. They can be applied as such, or better in conjunction with above.

"One of them is the burning of the grass. It is known that the young worms crawl up to the top of the grasses from where they reach the stomach of the host. The grass burning should be done in rotation—*viz.*, not the whole farm at a time, but in patches at different times of the year."

Thus Dr. Theiler; and the advice is full of instruction for us. In regard to the burning off of grass, a very common opinion of Queensland sheep farmers is, that on worm-infected country, the grass which grows after the burn cleans the worms out of the animal. This is a dangerous fallacy. It is true that wormy sheep do improve on grass grown on burnt country, but the explanation is this: The grass which comes after a burn is generally soft and nutritious. Worms are blood-sucking animals, and ruminants grazing thereon, make enough blood to satisfy the worms and leave enough for the sheep to improve in health and condition. The worms always get the first share of the blood. In the meantime, eggs of the worms, which have not been cleared out be it noted, are reinfesting the burnt lands. How quickly the land can be reinfested may be understood when it is known that one female stomach worm lays from 1,000 to 1,500 eggs, and there are thousands of female worms in the stomach of a badly infected sheep.

From the foregoing it is to be seen that, after a burn, or in the case of country free from worms, sheep should be dosed at least three times before being turned on to the land, especially if they are known to come off wormy country. Worms are to be found in sheep in the fourth stomach or abomasum.

Sheep have four stomachs,—First, the "paunch" or rumen. This is the reservoir. The animal gobbles the grass or feed and when satisfied lies in the shade and bringing up the balls of the food from the rumen chews it thoroughly. The chewed food passes into the second stomach or reticulum, otherwise known as tripe in cattle; from there it passes to the third stomach, the omasum or "bible," and then it is passed on to the abomasum or true stomach. It is here that true digestion takes place, and it is here that the thousands of worms are found in a badly infected sheep.

Two instances of several cases I know of, will illustrate the value of Dr. Theiler's arguments when properly applied.

In the first case a man kept one hundred and forty sheep on 14 acres of paspalum. These sheep were Romney Marsh, and had been on the holding for nine years, without trouble or loss of any kind. When I first inspected the sheep they were "mud fat," to use a sheep man's expression, and the youngsters particularly healthy. I warned the owner that on no account should be put strange sheep on his heavily-stocked paddock without thoroughly drenching them twice at least. Twelve months later I called at his place, and found that he had bought sixty "cheap" sheep from a holding notoriously worm-infested, shortly after my first visit. I learned that a few months after his purchase, all the strange sheep had died, all his own weaners, and the remainder of his one time beautiful flock, unthrifty

and full of worms. His land was hopelessly infected, and he had to give up sheep. *Note.*—He had not drenched the strange sheep. *He had put infected sheep on clean land.*

In the second case. About three years ago a telegram came to the office: "3,600 mixed weaners plenty water, grass, 600 dead, rest dying. This from a well-known holding in the Central West."

I thought "worms," and took up enough arsenic and Epsom salts to drench 3,000 sheep twice. One look at the flock showed heavy infection of stomach worms; worms had never been seen in the district before. The sheep were miserably poor and whitefaced, sluggish, and many of them badly "bottled." They were drenched twice and there were few more losses. I advised the owner to put them on to a clean paddock after the second drench, and he did so.

The history of the case shows "infected stock put on clean country," and shows that by following the advice of Dr. Theiler the paddock was cleaned, for the owner kept all stock out of the paddock for twelve months. He assured me eighteen months later that no more worms were found in sheep running there. This paddock was stocked with worms by a mob of worm-infested ewes from wormy country. Here was distinctly a case of clean country infected by wormy sheep, and country made clean by keeping ruminants off for twelve months.

DRENCHING, HOW AND WHAT TO USE.

Drenching is a cheap and simple operation. There are many different drenches on the market, but I have found arsenic and Epsom salts the best and cheapest of all. One of the best authorities in America, Mr. I. F. Craig, M.A., M.R.C.V.S., says in the "Veterinary Review," February, 1915, page 499, after reviewing the action of many worm drenches: "Arsenic, in my hands, has given better results than other drugs."

The arsenical drench I have found very useful is 2 oz. white arsenic (not less than 90 per cent. ars. acid), 6 lb. of Epsom salts, 5 gallons water.

Take an ordinary five-gallon drum, put about 3 gallons water in, and boil the water. Then add the arsenic and Epsom salts. Boil for forty-five minutes, stirring occasionally; add cold water to make 5 gallons.

Dozes.—2 oz. for adult sheep.

1½ oz. for sheep from 9 months to 18 months old.

1 oz. for lambs from 4 months to 9 months.

Fast the sheep for at least fifteen hours before drenching. Drench on four legs, keeping the head slightly above the level. The proper instrument for drenching is a conical-shaped measure, which is adjusted so that more than the proper dose cannot be given. They are to be obtained at any of the agents or retailers dealing in instruments for use with sheep.

Arsenic is a tonic, and dissolved with Epsom salts may be given every seventh day for about a month without danger.

SUMMARY.

Do not put clean sheep on infected country.

Do not put infected sheep on clean country.

If practicable, keep animals which chew the cud off an infected paddock for twelve months.

If practicable, burn off the grass on infected country and only allow clean sheep on the burnt country.

Weaners, or sheep from 3 to 9 months' old, are in danger of their lives if not drenched regularly on infected land.

Keep salt up to the sheep. It is hopeless to expect salt or any other lick to abolish worms, yet it acts in a certain measure against worms.

Overstocking will help to infect country in one-third of the time that reasonable stocking will.

Any country can be freed of worms in time.

Symptoms of worms are—pale faces, pale skin, pale eyes, tongues, and lips, and often a swelling under the jaw. This means anaemia. The most constant symptoms are scouring, eating of sand and earth, and unusual thirst.

A wormy sheep is one of the first attacked by blowflies.

Do not wait until the animal is dying before treating it, for often the symptoms are too advanced for the sheep to recover, even though the worms be removed.

RECOMMENDATIONS.

Do not introduce wormy sheep on clean country.

Do not introduce clean sheep on infected country.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report under date 11th January, 1923, from the Entomologist at Meringa, near Cairns (Mr. Edmund Jarvis).

Moth-Borers of Sugar Cane.

Whilst searching for hymenopterous parasites of our large moth-borer (*Phragmatiphila truncata*, Walk.) numbers of young ratoons with dead hearts were collected at Riverstone, near Gordonvale, which, when subsequently examined, were found to harbour larvæ and pupæ of the smaller Pyralid moth-borer (*Polyocha* sp.).

This insect, although a minor pest of cane, must be considered as being responsible at times for injuries of a rather serious nature, extending in all probability over a considerable area, but, fortunately, so far as observed, affecting only a small percentage of the crop.

On the 18th November, 1920, the writer collected from within an area of one square chain no less than forty-four dead hearts from ratoons eighteen inches high in a canefield at Pyramid, which, when examined, yielded thirty-three larvæ of *Polyocha* sp. In the present instance, however, about 8 per cent. of the shoots collected contained examples of this borer, and fully 8 per cent. of these were parasitised by a braconid wasp-parasite, *Tineid Moth-borer*.

Many of the dead hearts in ratoons got at Riverstone were caused by a little borer, smaller than a clothes-moth (9 m.m. wing expanse), of a dark slaty-grey colour. This pest proved very abundant at Pyramid in 1919, where it was observed infesting third ratoons. Out of seventy-five shoots examined by the writer at that time—about 10 per cent. of those destroyed on a space of about 100 square feet—no less than fifty-five were killed by this moth-borer, and twenty of these contained living specimens of the larvæ.

A full description, together with illustrations of the life-cycle stages of this new cane-borer, was published last year (1921) in Bulletin No. 11 of this Office. Strangely enough, although occurring commonly in several localities around Cairns, this insect was not included in any of our large collections of Australian *Lepidoptera*.

The severest infestations apparently occur among third ratoons, many of which spring from buds situated above ground level, the trouble being less noticeable in the case of first ratoons that arise mostly from buried eyes; while shoots from plant-cane originating well under the soil are rarely attacked.

Notes on Para-dichlorobenzene.

Since reporting on this subject last month, advice has come to hand that the United Kingdom can supply us with a crude form of commercial *P. dichlorobenzene* at £5 per cwt. This is a substantial reduction on the German quotation of £6 per 100 lb., but we are glad to be able to announce that, according to latest advice, the British Drug Houses, upon making further inquiries, find there is a more crude form of this compound which can be supplied at £4 per cwt.

This will bring the cost down to about £2 per acre for a treatment of one drachm injections placed 12 inches apart.

Up to the present we have experimented only with the refined brand of *P. dichlorobenzene*, marketed under the name of "Globol," so that the effect on cane-grubs of crude forms of this compound has yet to be determined. I am of opinion, however, that we shall find these cheaper brands efficient soil fumigants.

Results of Field Test.—On 2nd November a field experiment was started at Meringa in which forty-eight stools of young plant cane (D. 1135) were treated with $\frac{1}{4}$ to $\frac{1}{2}$ oz. injections, placed along one side of a row, and from 4 to 6 inches from the stools. The adjoining rows of cane on each side of the treated row formed controls.

All injections were 6 inches deep, some being placed immediately opposite the stools and others diagonally in intermediate positions.

When examined six weeks later (14th December) both treated and check stools had made equal growth, while results obtained were as follows:—

Injections of $\frac{1}{4}$ oz. placed diagonally and 4 inches from centre line of stools, and injections of $\frac{1}{2}$ oz. situated 6 inches from stools, but opposite same, had no injurious effect on the cane.

Injections of $\frac{1}{4}$ and $\frac{1}{2}$ oz. placed 4 inches from, and opposite stools, caused some of the outer leaves to wither and curl. The odour of the fumigant had penetrated about 10 inches on all sides of injections, and although the $\frac{1}{4}$ oz. doses had entirely evaporated, the soil was still charged with the smell of *P. dichlorobenzene*. In another experiment, injections of $\frac{1}{2}$ oz. placed 7 inches below the surface were found to have completely evaporated after fifty-one days, the rainfall during this period being only 91 points.

Emergence of Cane-Beetles.

The long continued dry spell of over three months' duration, terminated, happily, on the 21st instant, when 87 points were registered at our laboratory, followed next day by 46 points of rain.

Temperatures during the forty-eight hours immediately preceding these thunder showers had been very high, the maximum shade heat on the 19th instant being 170° F., and on the 20th 100.5° F.

Cane-beetles appeared close to the Station on the 22nd instant on feeding trees of *Eucalyptus tessalaris* (Moreton Bay Ash), but were not to be found in any numbers until four days later, when they were noticed on *Ficus pilosa* and *nesophila* as usual. Up to the present, however, the emergence has not been heavy at Meringa this season, owing, doubtless, to the recent drought conditions. Specimens collected on the 22nd were observed to be much rubbed, owing probably to repeated attempts to dig their way to the surface before the ground had become softened by rain. More rain (23 points) fell on the 27th instant, so that moist conditions favourable to further emergences have been maintained.

Lepidiota frenchi appeared very freely on the 23rd instant, being the year of its greatest emergence. Grubs of this species pupate at a greater depth than those of the grey-back, so are less likely to be affected by climatic influences.

Lepidiota rothei Blackb. and *Dasgynathus australia-dejeani* Mael. are in evidence as usual.

Species of the class *Insecta* appear to have suffered as a whole from the long spell of dry weather, insects of all orders being very scarce at present.

Office Collection of Insects.

In 1914, when first taking up a study of the cane-grub problem, the writer considered it advisable to form a collection of insects, comprising the following classes:—

- (1) Insects devouring the roots of cane.
- (2) Insects attacking the stalk and leaves internally.
- (3) Insects injuring stalk and leaves externally.
- (4) Insects closely related to our more destructive cane pests.
- (5) Useful insects, parasitic and predaceous.
- (6) Insects incidentally associated with sugar-cane.

During the past eight years a reference collection of this kind has been gradually acquired, but owing to our work in this connection having been of a spasmodic nature, the number of species collected has naturally been small, amounting in all to only 3,796 specimens.

Of these, about 380 species are beetles, of which, 101 species are closely related to our root-eating *scarabæidæ*.

Parasitic insects of the order *Hymenoptera* number about 123 species; while dipterous insects include 74, of which 21 are *Tabanidæ*, (March Flies) and 28 species *Asilidæ* or Robber Flies, the larvæ of the latter insects being predaceous on grubs of our cane-beetles.

Experiments with Aromas for Attracting Cane-Beetles.

This interesting form of control is at present being investigated, and results, so far, have been decidedly encouraging. On the 29th of this month, for instance, it was proved beyond doubt that *Lepidiota frenchi* can be attracted artificially by means of aromas distilled from the bark and foliage of certain of its favourite food-plants.

It remains to be seen by future experimentation which of these odours will prove to be the most attractive. We may, I think, consider this discovery a decided step forward in the right direction, since there is every probability that our grey-back beetle, as I have long believed, will be found to respond positively to odours of a similar nature.

Details of work in this connection will be given in next month's report.

PLATE III.—PREDACEOUS ENEMIES OF CANE GRUBS.

- Fig. 1. *Promachus doddi* Bezzi, female. Natural size.
- Fig. 2. Egg-mass of same, taken from leaf of sugar-cane. Natural size.
- Fig. 2a. Same, enlarged.
- Fig. 2b. Separate egg of same, more enlarged, showing segmented larva doubled up inside.
- Fig. 3. Grub paralysed by newly hatched Asilid maggot, attached to skin on thorax.
- Fig. 4. Maggot; full-grown.
- Fig. 5. Asilid pupa.
- Fig. 6. Larva of *Agrypnus mastersi* Pascoe.
- Fig. 7. The parent beetle, a skip-jack.

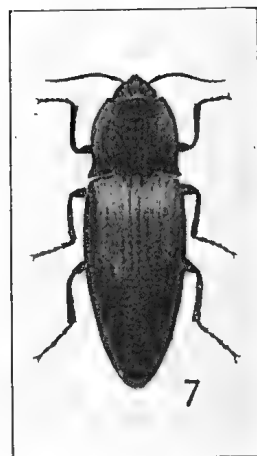
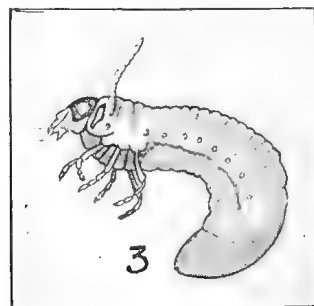
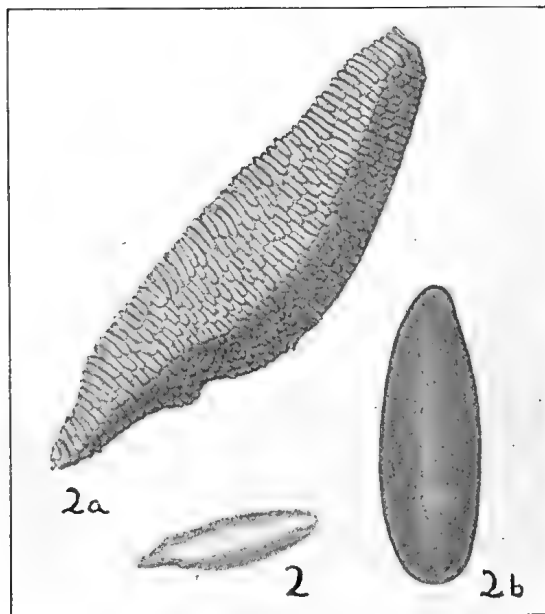
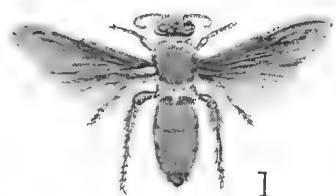
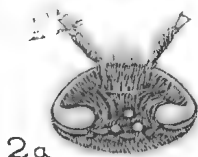


PLATE IV.—STAGES IN THE LIFE HISTORY OF CAMPSOMERIS RADULA FABR.

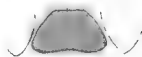
- Fig. 1. Adult female. Natural size.
- Fig. 2. Adult male. Natural size.
- Fig. 2a. Vertex, showing the three characteristic yellow spots. $\times 5$.
- Fig. 2b. Labrum, plain, which is characteristic of this species. $\times 5$.
- Fig. 2c. Pygidium, with characteristic yellow on proximal portion. $\times 7$.
- Fig. 3. Paralysed grub, showing characteristic position of the wasp egg.
Natural size.
- Fig. 4. The egg, two views. Magnified.
- Fig. 5. A male larva feeding; age seven days. Natural size.
- Fig. 6. A female larva, ten days old, still feeding. Natural size.
- Fig. 7. The cocoon of the wasp, in cell. Natural size.
- Fig. 8. The pupa of same, in cocoon. $\times 2$.



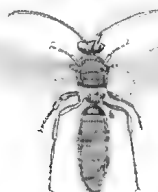
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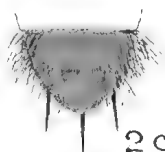
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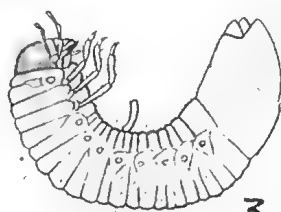
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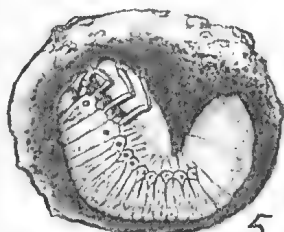
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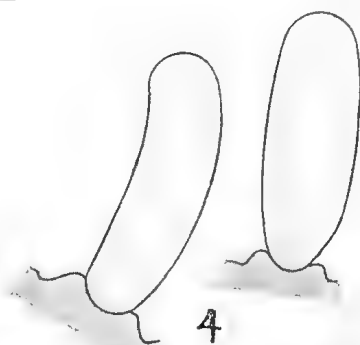
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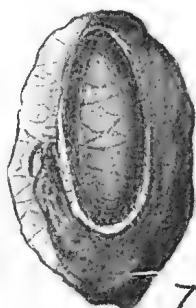
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PLATE V.—COMMON SCOLIIDS OF THE CAIRNS DISTRICT.

- Fig. 1. *Campsomeris tasmaniensis* Sauss., female, the usual marking. Natural size.
- Fig. 2. Male of same. Natural size.
- Fig. 2a. Showing the two characteristic small yellow spots. $\times 5$.
- Fig. 2b. Pygidium with no yellow, which is characteristic of this species. $\times 9$.
- Fig. 2c. Labrum, showing characteristic dark spot in centre. $\times 5$.
- Fig. 3. *C. tasmaniensis*, a variation in the marking of the female. Natural size.
- Fig. 4. *Campsomeris carinifrons* Turner, female. Natural size.
- Fig. 5. *Scolia formosa* Guér., female. Natural size.
- Fig. 6. *Campsomeris ferruginea* Fabr., female. Natural size.

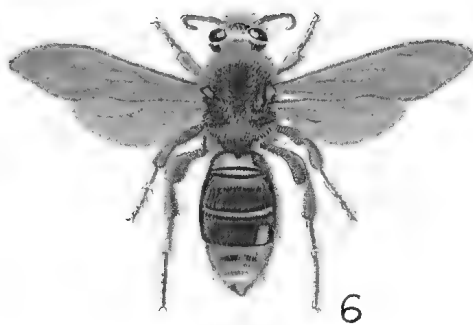
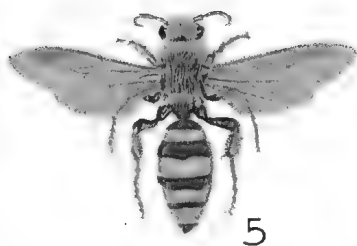
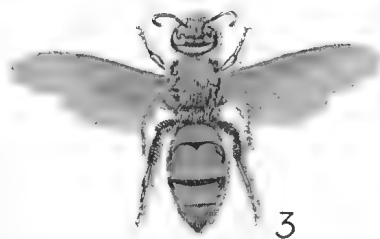
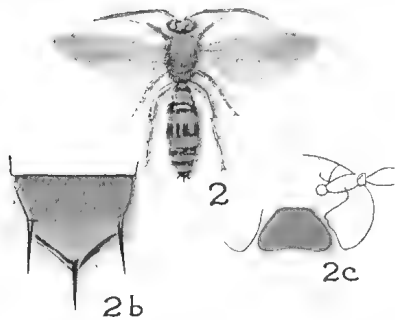


PLATE VI.—COMMON SCOLIIDS AND THYNNIDS OF THE CAIRNS DISTRICT.

- Fig. 1. *Scolia soror* Smith, female. Natural size.
Fig. 2. Male of same. Natural size.
Fig. 3. *Tiphia intrudens* var. *brevior* Turner, female. $\times 3$.
Fig. 3a. Outline, showing natural size of above.
Fig. 4. *Thynnus pulchralis* Smith, male. Natural size.
Fig. 5. *Zaspilothynnus vernalis* Turner, male. Natural size.

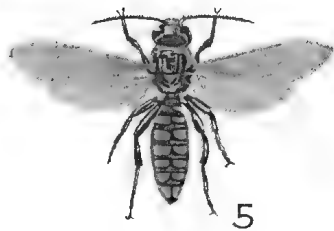
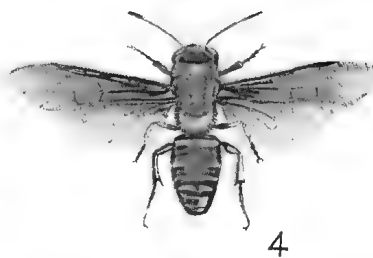
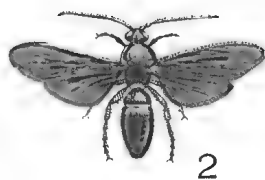
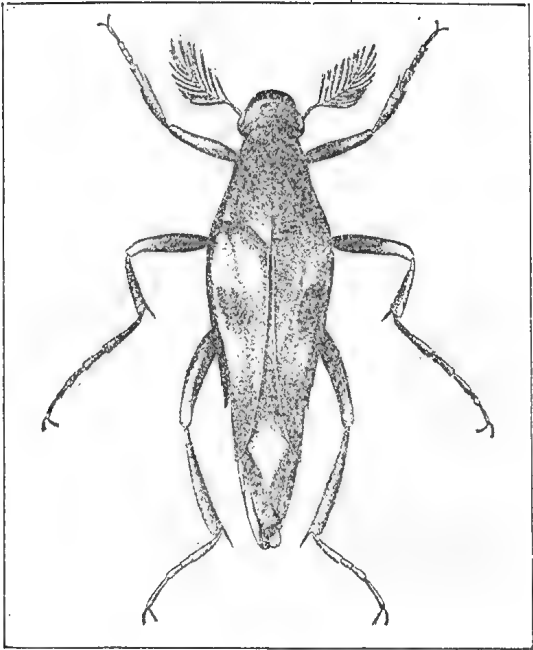
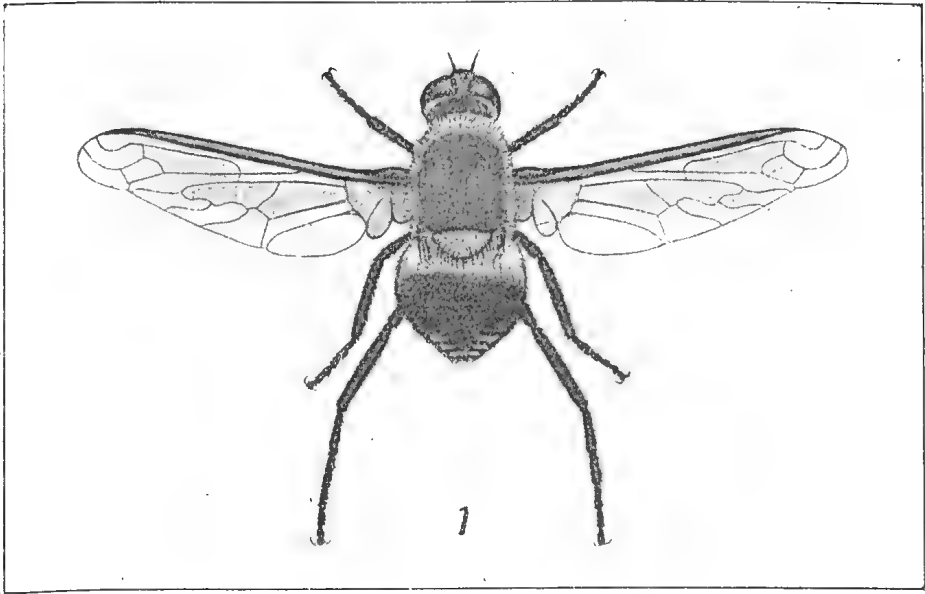


PLATE VII.—HYPERPARASITES OF SCOLIID WASPS.

Fig. 1. *Hyperalonia funesta* Walker. \times 2.

Fig. 2. A pupa of one of these flies. \times 2. (After Davis.)

Fig. 3. A Rhipiphorid beetle. \times 3. (After Davis.)



TOBACCO CULTURE—II.*

By M. P. MARTIN, Chief Controller, Tobacco Industry, Madagascar.

Translated by MAJOR A. J. BOYD.

The latest "Bulletin Economique," published by direction of the Governor-General of Madagascar, contains a very informative article on Tobacco Culture in Madagascar and on the East Coast of Africa. Methods of cultivation and after treatment of the tobacco crop, which will interest Queensland growers, are exhaustively set out, and from this article the following interesting notes have been abstracted. The first instalment appeared in the January Journal.—Ed.

Compactness.

TEXTURE OF THE SOIL.

The compactness, that is to say, the number of seedlings planted per acre, has a very great influence on the final quality of the tobacco. If, in the field, the plants have been placed too far apart, the development of the leaves certainly attains its maximum, but the parenchyma—that is, the soft or spongy substance—becomes thick and the rate per cent. of nicotine sensibly increases. The leaves harvested are heavy, but coarse, and are in consequence of a reduced commercial value. If the compactness per acre is too great—i.e., if the plants have been too closely planted—each one may, while showing apparently real good qualities, have actually not developed sufficiently.

To obtain the maximum return, the number of plants set out per acre must oscillate between very narrow limits. But what should be these limits? This is an unknown quantity yet to be determined. Meanwhile, until this has been done, I advise, for lands slightly heavy and very rich, capable of giving good returns, to space the plants in rows about 5 feet apart, and about 4 feet apart in the rows—about 12,000 plants per acre. In the case of light soils of medium fertility, the distance between each row a little less than 4 feet apart, and about 3 feet apart in the rows, making about 17,000 plants per acre.

WEEDING, DOUBLE PLOUGHING, EARTHING UP.

I think it is needless for me to dilate upon the advantage of weeding, double ploughing, and earthing up. Besides the destruction of noxious weeds, second ploughings are immensely useful, during a dry season, in delaying the desiccation of the soil and thus by keeping the land fresh, enabling the normal growth of plants which would otherwise suffer from want of water which would prematurely be the cause of signs of premature maturity. The earthing up consists in surrounding the base of the stem with a good heap of soil. Its beneficial effects are indisputable.

As soon as the plants have attained a sufficient height, the two seminal leaves are twisted off. Then a portion of the soil is drawn up around the stem. The adventive roots, which strike out almost immediately near the wound caused by taking off the leaves, develop rapidly in the upheast soil and prepare an increase in the crop which pays largely for the process of earthing up.

PRUNING, TOPPING.

The leaves on a naturally growing tobacco plant are not all of the same size or the same chemical composition. Their individual values are consequently very unequal. On examining separately each leaf, from the top or bottom, one becomes aware that their dimensions, length, and breadth, increase progressively to obtain a maximum height, then they decrease rapidly and bear no more but a few small leaves at the very top, the size of which deprives them of all commercial value.

As to the thickness of the parenchyma, it has been shown that there is an increase starting from the base to the top. The percentage of nicotine increases under the same conditions, and in strong proportions. Thus it is that in certain varieties the leaves near the soil, or lower leaves, may not contain more than .50 per cent. of nicotine, the percentage of alkaloids will increase from leaf to leaf to reach 2 per cent. towards the middle of the plant, 4 or 5 per cent. in the last leaves of marketable size, and a rate per cent. still higher in the by-tongued leaf, located under the flower. If the plant of tobacco is allowed to grow freely, the ground leaves will show a feeble development and consequently a very poor weight (500 to 600 leaves to a kilogramme), whilst at the top of the stem there will be leaves too small to have any commercial value, besides which they are too highly charged with nicotine.

**Bulletin Economique de Madagascar.* La culture du Tabac a Madagascar (Extraits du rapport de M. le contrôleur principal Martin, des manufactures de l'Etat en mission à Madagascar).

Pruning is an operation which consists in destroying at the base of the plant, besides the two seminal leaves which should have been removed during the process of earthing up, two or three leaves of little value because of their want of weight and almost entire want of nicotine. It is effected by breaking at several inches from the stem the petiole of the leaves to be done away with, and abandoned eventually on the field.

Topping is the operation by which the stem is divided near the summit in such a manner as to retain, on each plant, the exact number of leaves which will admit of obtaining the best returns in weight as well as in quality. The operation is a somewhat delicate one, but it really presents no difficulty. In fact, it is sufficient to separate, with due care in order not to injure them, the leaves composing the terminal bud and to cut off with the finger-nails or some simple instrument, on the plant, the upper part of the stem which bears the floral bud, and the three or four leaves situated immediately below it, which are very rich in nicotine and would only obtain a small size. This being done sufficiently early, topping allows the sap to afford nourishment only to the saleable leaves, which will thus attain the maximum development.

If the number of leaves thus preserved on each plant is considered insufficient—that is to say, if the stem has been divided too low—each leaf attains a strong development, but the tissue composing it is thick and coarse, therefore of inferior quality. Furthermore, whatever may be their individual dimensions, the weight of the whole of the leaves per plant will be poorer than it would have been if the number of leaves saved had been greater.

If, on each topped plant, too many leaves are allowed to remain—that is, if the stem has been cut off too high up—each leaf will possess the required fineness and quality, but the total will not weigh more than it would have yielded had a few extra leaves been suppressed.

As a résumé to enable me to make myself understood, I will say that each plant is capable of producing, with a proper number of leaves (say x) the maximum of weight and quality. If, after topping, the number of leaves retained is absolutely less than x , there will be a loss of quality and weight. If, on the contrary, on each plant a number of leaves has been retained superior to x , the weight and quality of the product harvested remain invariable. The gross yield will neither be greater nor less, but we shall have to deal with a greater number of leaves, and hence there will be loss of time and money. This loss, not being in all cases very light, we arrive at the conclusion that it will be more worth our while to top too high than too low. In other words, it is more worth while to retain on each plant a number of leaves more than x , rather than a less number.

But what is this number x of leaves to be preserved? It is materially impossible to give it a decided fixed value. It must vary according to the variety cultivated, and even for the same variety, according to the soil and locality where planted. It is thus that a tobacco plant will yield on any plantation its maximum return with nine or ten leaves, whilst another plant from the same batch of seed and of the same sowing, but transplanted elsewhere, only reaches its maximum with seventeen or eighteen leaves, perhaps more. These two maxima are not similar in any respect, and may vary in large proportions. M. Martin here cites many examples of the similarity and variations of the tobacco plant in France, Paraguay, and elsewhere, and concludes this item of his paper as follows:—"One can understand, under the aforesaid conditions, the impossibility of fixing for each plant, and even for each variety, a fixed number of leaves to be retained per plant. It is for the planter to determine—the rest is easy."

PRODUCTION OF SEED.

Some indigenous varieties of tobacco develop a splendid foliage and certain qualities highly appreciable; the types of a fixed character must be determined, and must be classified, and the qualities of each must be carefully judged, and by cultivation to develop those which appear likely to give the best return.

Seeds of foreign origin may possibly for the first year show satisfactory results, such as the physical appearance of the plants, and the kind of aroma; still, when cultivating the second generation, the whole of its original characteristics may disappear more or less completely. It follows that the highest yield of the first crop may diminish in considerable proportions in the second generation.

There is certainly a solution of this question—for instance, the establishment each year of experimental seed plots of such seeds—but I would only advise this course to be adopted for such varieties as present in a first sowing clearly superior qualities, enabling them to command a high price in the European markets. It is important to select such varieties as can be acclimatised without visible transformation, and a few of those which have for a long time in the country been showing such qualities as would suffice to render their cultivation largely remunerative. It is with

the object of drawing the attention of planters to the reproduction of these varieties as reproductresses, as the poor harvests of seeds, quickly brings on the crossing of the varieties.

Another matter of importance is the choice of, as plant mothers, the most vigorous kinds, and the most healthy, as certain diseases are capable of transmission by seed. Before starting to top the plants, the planter should look round his plantation and select the plants whose appearance presents the characteristics of the variety grown; such as the junction of the leaves with the stem, shape of the leaves, number and condition of the nerve system, being at the same time always careful to their fineness and to the size of the angle which they make with the median stalk or rib. The mother plants should be marked and allowed to grow freely.

When the seed capsules assume a chestnut colour the bunch is cut off and set away to dry, stem downwards to prevent the seeds falling out of the capsules. Nothing more need be done further than, when the capsules are dry, to crush them and winnow the husks from the seed. Tobacco seed will preserve their germinating power for several years if kept dry.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF DECEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING DECEMBER 1922 AND 1921 FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Dec.	No. of Years' Records.	Dec., 1922.	Dec., 1921.		Dec.	No. of Years' Records.	Dec., 1922.	Dec., 1921.
<i>North Coast.</i>					<i>South Coast—continued :</i>				
	In.		In.	In.		In.		In.	In.
Atherton ...	7.35	21	12.12	6.42	Nambour ...	6.30	26	5.15	13.76
Cairns ...	9.19	40	1.97	10.26	Nanango ...	3.71	40	5.19	13.11
Cardwell ...	8.46	50	7.71	13.63	Rockhampton ...	4.62	35	4.13	19.42
Cooktown ...	7.09	46	1.54	7.97	Woodford ...	5.41	35	4.66	12.73
Herberton ...	5.66	35	6.08	7.27					
Ingham ...	7.21	30	5.85	9.55	<i>Darling Downs.</i>				
Innisfail ...	12.23	41	4.41	17.72	Dalby ...	3.09	52	1.80	9.10
Mossman ...	13.00	14	4.42	24.28	Emu Vale ...	3.58	26	4.35	6.52
Townsville ...	5.53	51	6.82	5.55	Jimbour ...	3.16	34	2.16	7.68
					Miles ...	2.54	37	4.16	6.02
<i>Central Coast.</i>					Stanthorpe ...	3.48	49	5.87	6.61
Ayr ...	3.58	35	5.94	9.09	Toowoomba ...	4.19	50	3.78	8.07
Bowen ...	4.43	51	7.34	9.70	Warwick ...	3.50	57	4.29	9.27
Charters Towers ...	3.51	40	6.12	3.50					
Mackay ...	6.89	51	5.86	13.38	<i>Maranoa.</i>				
Proserpine ...	8.93	19	7.59	19.66	Roma ...	2.34	48	5.30	4.89
St. Lawrence ...	4.49	51	11.16	18.01					
<i>South Coast.</i>					<i>State Farms, &c.</i>				
Biggenden ...	4.47	23	3.60	12.50	Bungewongorai ...	2.45	8	7.64	3.81
Bundaberg ...	4.73	39	4.79	15.89	Gatton College ...	3.45	23	3.08	7.60
Brisbane ...	4.96	71	4.59	11.33	Gindie ...	2.61	23	3.98	2.16
Childers ...	5.30	27	8.67	15.45	Hermitage ...	3.03	16	3.85	7.47
Crohamhurst ...	6.83	30	8.96	14.49	Kairi ...	7.43	8	4.06	5.78
Esk ...	4.35	35	6.22	11.85	Sugar Experiment Station, Mackay	8.25	25	4.85	14.50
Gayndah ...	3.92	51	4.26	11.11	Warren ...	3.78	8	4.19	10.05
Gympie ...	5.73	52	6.30	11.14					
Glasshouse Mts. ...	6.72	14	6.44	11.67					
Kilkivan ...	4.28	43	3.94	12.33					
Maryborough ...	4.65	51	6.38	11.23					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for December, 1922, and for the same period of 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
State Meteorologist.

EMPIRE COTTON GROWING.

The world production of cotton per annum is approaching 20,000,000 bales (of 500 lb.) of which the United States, in normal years, supplies about 70 per cent. The principal industries in Great Britain are those connected with cotton manufacture in its various phases, requiring about 4,000,000 bales of raw cotton per annum. The present position is that the world's consumption of cotton must increase, the United States supply may decrease owing to the boll weevil trouble and labour difficulties, consequently new sources of supply become a matter of immediate importance. Cotton-growing is not so simple and easy as some people think, but there is no doubt that, with organisation and scientific methods, the Empire could supply a large proportion, if not all, of its own cotton requirements, and, in particular, Australia may become a great cotton-producing country.

The above considerations are well known to cotton-growers and manufacturers, but in the public mind there is some confusion as to the various organisations which have been formed to develop cotton-growing within the Empire. The following particulars as to these organisations, together with some notes as to the cotton produced, supplied by Mr. S. W. B. McGregor, Senior British Trade Commissioner, will be of interest.

British Cotton Growing Association.

The British Cotton Growing Association was formed in London some years ago and has done excellent work in promoting the growing of cotton, largely in Africa. This association works on commercial lines, and in developing new areas will handle the cotton when grown, or in other words, will gin, bale, and dispose of the cotton on the Liverpool market.

The increasing importance of the subject led to the appointment by the Board of Trade, London, of an Empire Cotton Growing Committee, which, after nearly three years' investigation and inquiry, issued its report in October, 1919.

Empire Cotton Growing Corporation.

As a result of the above committee's labours the Empire Cotton Growing Corporation was established by Royal Charter in November, 1921. The general policy of the corporation has still to be determined, but apart from exploration and the investigation of new pioneer schemes, the principal work of the corporation will be of an educational character. Facilities will be provided to enable men with training to take up graduate studentships and readerships at British Universities in special cotton subjects. When trained, these men will be attached to the agricultural departments of the Dominions and Colonies. This work is considered of great importance, as any development of cotton-growing on a large scale must be on scientific lines and there must be a better supply of men competent to give advice and assistance to native and other growers.

It is proposed to obtain funds for the corporation by means of a compulsory levy on British cotton spinners of 6d. per bale of 500 lb. of cotton. A Bill to this effect was introduced into the House of Commons in July last, but failed to pass before the session closed.

The Empire Cotton Growing Corporation will work in close co-operation with the British Cotton Growing Association, the Earl of Derby being president of both bodies.

Australian Cotton Growing Association, Limited.

The Australian Cotton Growing Association, Limited, was registered in London in 1920. The Australian Cotton Growing Association, Queensland, Limited, which is a subsidiary to the London company, was registered in Brisbane in April, 1922, with a capital of £200,000. The latter is now in process of reconstruction to permit of greatly increasing capital and extension of its activities, which will include the ginning and marketing of Australian cotton and the establishment of oil mills.

Progress Made.

The estimated amount of cotton grown in new fields in the British Empire, mainly in Africa, between 1913 and 1921 (in bales of 400 lb.) was:—

1913	..	72,800	1914	..	82,350	1915	..	75,200
1916	..	78,800	1917	..	72,600	1918	..	54,900
1919	..	79,600	1920	..	105,800	1921	..	164,000

The progress made is largely, if not wholly, due to the activities of the British Cotton Growing Association.

Notes on the most important new fields, in order of the quantity produced, are as follows. The cotton production is given in bales of 400 lb. and is for the year 1921.

Uganda.

Area, 110,000 square miles; population, 3,000,000. The Government impose a revenue tax of £1 per bale. Possibilities for extension of cotton-growing considered good. Production, 81,300 bales.

Sudan.

Area, 1,000,000 square miles; population, 3,500,000. Principally grown under irrigation. Quality good. Scheme in hand to cultivate 500,000 acres, estimated to yield 400 lb. cotton lint per acre. Railways required for transport. Production, 40,000 bales.

Nigeria.

Area, 336,000 square miles; population, 17,000,000. Production, 32,000 bales.

Tanganyika Territory (Formerly German East Africa).

Area, 348 square miles; population, 4,000,000. Germany considered possibilities of cotton-growing very favourable. Production, 7,500 bales.

West Indies.

Produce the finest Sea Island cotton grown in the world. The islands are small in area, and as there are other industries the possibilities of increasing the supply are limited. Production, 3,500 bales.

Nyasaland.

Area, 40,000 square miles; population, 1,250,000. Cultivation on the dual system, partly by European planters and partly by natives working their own land. Transport difficult and railway extensions essential. Production, 2,800 bales.

South Africa.

Cultivation of cotton arousing interest amongst farmers in certain districts of the Union of South Africa and Rhodesia, but is impossible in many of the provinces. In North and South Rhodesia, Northern Transvaal, Natal, and Swaziland, the farmers are successfully growing small quantities of cotton, and the prospects are considered good. Production (South Africa and Rhodesia), 2,000 bales.

Australia.

Estimated that there are 30,000,000 acres in Queensland capable of producing cotton; but some doubt exists in Lancashire as to whether the cotton industry, that depends on abundant and cheap labour, can maintain itself in Australia. Production, 800 bales in 1921, and 2,500 bales in 1922. Estimated production, 40,000 bales in 1923.

Kenya Colony (formerly British East Africa).

Area, 200,000 square miles; population, 4,000,000. Prospects uncertain. No production.

Mesopotamia.

Area (British Mandatory sphere), 150,000 square miles; population, 2,850,000. Soil and climate similar to Egypt. Great possibilities, and it is believed with a sound irrigation system about 1,000,000 bales per annum could be produced.

India.

Area, 1,803,000 square miles; population, 315,000,000. Production last season over 5,000,000 but quality only suitable for coarsest yarns and of very little use to Lancashire. Possibilities of improvement are enormous.

Ceylon.

Area, 25,840 square miles; population, 4,500,000. A little cotton grown from time to time, but for various reasons no progress made.

Other.

Cotton is also produced in small quantities in Cyprus, Fiji, Malta, Turks, and Caicos, but with the exception of Fiji is harsh and short stapled.

NOTES ON THE CITRUS ORANGE BUG (*ONCOSCELIS SULCIVENTRIS*.)

Subjoined is a preliminary report on observations made and investigations carried out in the Blackall Range area by Mr. Henry Tryon, Government Entomologist and Vegetable Pathologist, from the 15th to the 17th of January, 1923. This report was furnished by Mr. Tryon to the Under Secretary, Department of Agriculture and Stock (Mr. Ernest G. Scriven) for transmission to the members of the Mapleton Local Producers' Association, at whose request Mr. Tryon made the visit to the citrus groves on the Blackall Range and of which this report is the outcome. As the subject is one of general interest to fruitgrowers at this juncture, the observations and conclusions of Mr. Tryon have especial relevancy.—Ed.

Locality.

For the purpose of the inquiry the following typical orangeries were visited—all situated in the Flaxton area—viz., those occupied by Mr. H. Morris, Mr. J. F. Power, Mr. J. McIver, Mr. R. Morris, Mr. G. Still, Mr. A. D. C. Hetherington, and Mr. R. B. Shaw. (NOTE.—It was intended to include Mr. Dickson's orangery, where infestation during 1922 had been so pronounced, but Mr. J. Dickson was temporarily absent from the district.) Whilst local inquiry was restricted to these areas, it is not to be inferred that the presence of the insect does not extend throughout the Mapleton, Flaxton, and Montville area.

Insects Present.

These, so far as the usually recognised phases are concerned, were nearly all in the adult state—bearing organs of flight—as may be inferred from a description of a small collection obtained on the day preceding our visit. This comprised eighty-eight adults and eight larvæ representing three different stages of growth. However, the percentage of the larger larval forms was generally much below 8.3 per cent. as shown by this. With reference to the numbers, it was an uncommon occurrence for there to be as many as twenty bugs upon a tree; but by actual count growers had found, at an earlier period in the season, as many as 400 on small citrus trees and 1,400 on larger ones. The present relative decrease in numbers was evidently to be accounted for in part by the efforts at bug-destruction that had been systematically pursued. The two sexes were about equally represented in the insects present on any tree.

Insect Occurrence.

The adult insects occurred principally in clusters from two to ten, rarely in larger number. Clusters of eighty are said to have been earlier noted, but often solitary bugs, especially females, were noticeable. These insects, especially if solitary, readily took wing on disturbance after falling a few inches, from 6.30 a.m. onwards, and as long as sunshine prevailed.

They occurred for the most part closely united male and female, and where any group contained an uneven number of the respective sexes the odd insect might be male or female. The adult insects no longer attacked the developing fruit, even where this was still quite small (but already hard). They were confining their attention to the tender shoots. These, subject to the injury occasioned by the insects' penetrant and sucking mouth-organs, first curled over, and their young and small leaves shrivelled up and darkened, as did also the stem itself. It was to be inferred, also, from features present, that whilst so feeding they did not infrequently communicate disease—a fact that would suggest that some forms of citrus "die back" may originate in their habit. It was also to be observed that, apart from the former injury to the young fruit and its consequent dropping, an unseasonable flush in vegetative growth had often resulted in a manifestation more recent, however, of the same phenomenon.

It was noteworthy that the female bugs engaged in their amours—that were of long continuance—did not desist from feeding, and that they invariably settled themselves higher on the shoots than their consorts where the tissue was more succulent. (NOTE.—These facts are not without bearing on the question of the most expedient method of capturing the adults at the time of the year covered by this inquiry.)

Egg Production.

It was found that the ova had already grown to a large size in the interiors of the female bugs before these were visited by the males. Also that they are associated with large nutritive cells that appear to be largely absorbed before these eggs are actually fertilised. This suggests—as is actually found to be the case—that they are capable of hatching very soon after being laid.

Egg-deposition.

After evidently some days of what we may term "wedded life," the adult Orange Bugs separate and disperse. However, the females, already ready to lay their eggs, do

not travel far from the shoot on which this has been spent, often but a foot or two. In fact, individual female bugs, where several have been clustered together, may remain side by side and lay their eggs upon the same leaf. (NOTE.—This fact has a bearing on the successful search for the egg-batches.) In selecting a site for the eggs, a shoot is taken on which the foliage, although still pale and of a green, delicate nature, has about attained its full size. Exceptionally, however, they are deposited on old leaves, and not on these young ones. They are in by far the larger number of instances placed on the under leaf surfaces, especially where an adjoining leaf is almost opposed to this beneath. Their deposition is a matter of minutes only. Almost invariably each female lays fourteen eggs—only once have we met with fifteen. Moreover, with almost similar frequency, the eggs are laid side by side in a batch with a uniform arrangement—viz., a row of four in the middle, three on each side of this, and two again outside each of the latter rows. Exceptionally two batches may be laid side by side by two female bugs so as to form a single egg-mass. These eggs are spherical, glossy, pale leaf-green, and measure 2.5 mm. in diameter. When hatched the empty eggs are colourless and glass transparent.

Production of Larval Bugs (First Stage).

When laid (as we have seen) the embryo-bug is already well advanced in growth. Within a few days its limbs and the antennæ with their now red tips can be seen through their transparent shells. When eight to nine days have elapsed from the time of laying, hatching takes the young larval bug with its limbs still folded, pushing open a small circular convex cap that separates from the remainder of the shell along a line of small pores. These larval bugs are of a delicate green colour and of a bright hue, oval in outline and lowly convex. They measure 5 mm. x 3.5 mm. When hatched out, they remain side by side upon the under leaf surface, and apparently feed little, if at all. With the slightest disturbance, which may fall short of shaking, they voluntarily detach themselves, fall to the ground, and crawl about in different directions, to be soon lost if herbage is at hand. This is the stage at which, as it has been stated, the orange bug arrives on the Blackall Range, the adult insects and these diminutive larvæ, that are said to be met with during January and the succeeding month or two. Then it is said they quite disappear and are not to be met with, not a single bug, during the ensuing winter—two or three months (H. Morris). In the course of this brief inquiry, however, it was practicable to point out and demonstrate that there was a second larval stage that shortly succeeds the first, with habits that might throw light on this apparent temporary disappearance.

Within a few days, the Orange Bug larvæ of the first stage cast their skins; and this happens even when they have so far not partaken of any food. This moult, however, gives rise to a larvæ (second stage) very different both in appearance and habit from that representing the first stage from which it has been naturally derived. Though still pale-green, its body is now much flattened as if "beaten out," narrows somewhat towards the head, instead of being regularly oval, has the thoracic segments defined above by angular instead of curvey lines, and has the antennæ red-tipped (instead of black), whilst these organs placed together are now directed straight forward. The upper surface also is dull instead of being glossy, and finely wrinkled and areolate instead of being smooth. It now measures 7 mm. by 4.5 mm.

For a brief period, fourteen of these second-stage larvæ may congregate side by side on an under leaf surface, taking the place of the fourteen first-stage larvæ they have arisen from. These individuals may now move off one by one, dispersing themselves over the tree on which they happen to be, their movements being relatively rapid. As thin as paper, they now adhere flatly to their support—the under leaf-surfaces—and their colour harmonising with that of this, they are with difficulty only discerned on a tree, even if it be a tree but 18 inches high on which they occur. Further, being quite unlike (as we have seen) the larvæ of the first stage in this respect, not only do they not readily detach themselves voluntarily, but rarely can they be caused to drop to the ground from the branches of the tree on which they occur on these being suddenly banged. In fact, our efforts in this direction have only enabled us to secure individual second-stage insects, when, on the other hand, many larvæ of the first stage have been thus obtained, although we have known that the former have largely outnumbered their younger associates. (NOTE.—No statement can be made as to the length of the period passed by the Orange Bug in this second-stage phase of life. It is a matter that is being experimentally inquired into.)

Occurrence of Eggs and Larvæ of First Stage on Trees.

On a single small orange tree (estimated age ten years, H.T.) occurred twenty-nine batches—all of those save one consisting of fourteen—a total of 405 eggs. This number probably fell short of the actual occurrence, as it was impracticable in the brief period available to discover nearly all those present. Further, some mature female insects were also present to furnish additional eggs.

This quota of eggs was furnished by a tree in an orangery from which all the bugs discoverable on systematic "beating" or "tapping" have been removed, when for the most part in the larval stage, and although the number found, or estimated to occur, was evidently in excess of those present on the trees of the orangery generally, it illustrates:—

- (1) The extent to which in early January orange trees, older ones especially, may harbour eggs; and
- (2) That either the removal wholly of orange bugs by "beating" or "tapping" is not practicable, or, as is much more likely, "clean trees" are liable to be bug-infested from without, when their systematic "cleansing" is not generally undertaken by citrus growers through co-operative effort.

Of these twenty-nine batches the eggs of three had already hatched on 16th January, and from data to hand all would have done so on or before 25th January.

In other trees the proportion of egg-batches that had already hatched was larger.

Flying Powers of Adult Insects.

During the period occupied in the inquiry the conditions of permanent sunshine and warmth were very favourable to the exercise of the flying habit by the adult Orange Bugs. When disturbed, and often on slight disturbance only, they dropped a few inches only and then took wing. Thereupon they not only would at times repair to a neighbouring tree, but also fly far afield. Specific instances of their moving through the air far overhead in a definite direction until beyond the reach of vision occurred. This observation confirming previous ones suggests:—

- (1) That the method successful in capturing immature Orange-tree Bugs as ordinarily practised requires to be greatly modified if that of the adults is aimed at; and
- (2) The readiness with which an infested orangery may become a source of infestation for one originally non-infested or rendered so by special effort.

Larval or Nymph Orange-tree Bugs and Tree Attachment.

The insects show a varying degree of closeness in their adherence to their host plants, and corresponding difficulty with which they are capable of being dislodged according to the stage of life in which they occur. Thus of the five of those preceding the adult stage, they are detached most readily in their first green stage, and with greatest difficulty during the second and fifth stage (final)—i.e., the one before that of the adult one is attained.

Native Source of Infestation.

It has been suggested that, inasmuch as the Orange-tree Bug (*Oncoscelis sulci-ventris*) is a native insect and has originally proceeded from some native tree—

- (1) That its indigenous food plants comprise not only our species of Wild Lime or Wild Orange (*Citrus australis* and *Citrus australasica*), but the other species of *Rutaceæ* that include these also; and
- (2) That each year this injurious insect forsakes the orangeries in its hosts to repair to the scrubs that contain these trees, to return once more to the orangeries with the advent of spring and reinfest them.

The latter suggestion is not in harmony with the observations made by me and the testimony of local growers. In fact, a member of the Citrus Council, Mr. H. Morris, who probably has given more attention to the Orange-tree Bug than anyone whom I have had the privilege of meeting, goes so far as to state that—

"We don't see the fully developed black bugs until the beginning of December, or, it may be, until the latter end of November, their occurrence then being preceded by wingless larval insects or nymphs."

On the other hand, it would appear certain that the insects, finding a congenial home in the orangeries and all there that they require for their sustenance and life generally, not only maintain the original colony or colonies, apparently usually small in some cases, but yearly increase in the course of natural development until eventually their numbers (they having no formidable enemies) are beyond conception so to speak.

With regard to native host plants, a survey of a small native scrub, containing both citrus and other indigenous (*Rutaceæ*) plants, failed to bring to light a single Orange-tree Bug, and their occurrence elsewhere, even on native *Citrus* spp., as judged by former observations, is occasional only. Mr. W. B. Petrie, of the Forestry Department, whose knowledge of Queensland scrubs, scrub trees, and the more obvious insect associations of trees is generally recognised, had indeed stated that

he has never yet seen the Bug on a native citrus, although an insect resembling it, and that may be the *Oncoscelis** (but still to be identified) he has encountered on *Pentaceras australis*, Hook-fil (*Rutaceæ*).

*NOTE.—An insect that, when adult, closely resembles *Oncoscelis sulciventris*, and is named *Stilidia indecora* has been confused with it, even by entomologists.

This conclusion points to the urgency of procedures that would not otherwise be even expedient, i.e.—

- (a) To make war on the insects whenever they appear in an orangery, or indeed on an isolated citrus tree, even when few are present, and no noticeable ill-effect is traceable to their presence. As the outcome of an opposite course of action, suggested by the theory of an annual visitation, may be cited the most grossly infested orangery in the Blackall area (that there is no occasion to specify here) where—as has been reported in the Press—insects during the latter end of 1922 were collected in kerosene tins. Herein they occurred in the previous year, in far less numbers, and were allowed to live and breed unmolested then, on the understanding that there might be no recurrence in 1922.

On the other hand, continued systematic measures of repression during 1920, 1921, and 1922 on a neighbouring orangery has greatly reduced the numbers there. And, as

- (b) A second procedure to regard every infested orangery or citrus tree as a menace for the succeeding year to orangeries or citrus trees still unvisited by the insects.

Citrus, Relations of Orange Bug.

The insect was observed—as already elsewhere—on all the kinds of citrus in cultivation—including not only oranges and mandarines proper, but also lemons and citrons. Possibly, further inquiry might discover a predilection on the part for certain of these.

NATURAL ENEMIES.

Being one of those who earliest dwelt on the important role served by natural enemies in controlling insect pests (*vide* Tryon, II., Insect and Fungus Pests, I. 1889 *passim*), the question of the extent to which these were operating in the district received special attention.

Egg Parasites.

I found not a single instance of the eggs of the insect being parasitised, notwithstanding several thousands were examined. This was surprising, since it had come under my notice that, in the case of another large Orange-tree Bug, equally injurious elsewhere to citrus—the “Horned Green Bug,” *Biporus bibax*, Breddin; a small hymenopterous insect bred in the ova, and thus consumed their contents. However, a small percentage of the eggs in some egg-batches had failed to hatch, and these had either collapsed or developed a brown colouration; but in this case mere natural death seemed to have supervened.

Predatory Insects.

Two other heteropterous insects were found preying upon the Orange Bug (*Oncoscelis sulciventris*). These insects insert their mouth organs in their living victims, in the part usually corresponding to the neck, and gradually extract their blood, just as the latter have been drawing upon that (the sap) of the citrus trees on which they subsist. These natural enemies are species of the bug-genera *Asopus* and an ally.

However, both these predatory bugs were of exceedingly uncommon occurrence at the time of the visit. This fact, and the circumstance that a single Orange Bug appears to provide sustenance for a single individual enemy for days, is an indication that their services in repressing the latter insect were insignificant.

Birds.

(a) *The Drongo* (*Chibia bracteata*).—A bird of medium size, of a dark colour, the plumage having a decided sheen, with a fork tail and red eyes, that I originally described as an enemy of the noisome insect under consideration, was present, but in far too few numbers to exert much influence in controlling it. This is a usual denizen of the scrubs and is being reduced in numbers with their disappearance.

(b) *Dollar Birds* (*Eurystomus pacificus*).—This exclusively insectivorous bird was seen in the orangeries under circumstances that would suggest that it was capturing Orange-tree Bugs, but I have no direct evidence. I was not disposed to

shoot one in search of this—i.e., of its capturing any—nor does my previous inquiry into its dietary favour the view that it preys upon the insect in question.

(c) *Shrike Thrush* (*Graucalus melanops*).—This bird also present was pointed out as one that feeds upon the Orange-tree Bug under consideration. The remarks under Dollar Bird will apply here. It is the local "Blue Jay."

(d) *Quail*.—These birds, paired and with eggs, were found in two orangeries. From my knowledge of the habits of these it would appear that they would prey on the bugs, especially in their earliest green stage when these insects are so readily induced to precipitate themselves to the ground. As, however, the species of quail referred to nests in herbage it is difficult to realise that is can accomplish much in this direction in orangeries kept clean, as should be the practice.

Fowls.

(e) It was surprising to note with what avidity these fed upon the insect when brought to the ground—not excepting the adults. In fact, it was observed that in Mr. H. Morris's orangery some of these birds would dog one's footsteps as one walked amongst the trees and contend for the insects that had been caused to fall. It is a matter for consideration how far this habit is general in fowls and possible of being availed of.

Disease.—Presence not noted.

NOTE.—From this survey, it will appear that the more formidable of the natural enemies that usually very materially destroy harmful insects of this bug kind are absent at present from the district, and cannot be regarded as a factor in controlling the numbers in which the present one occurs. At the same time this absence, together with an indisposition to take any steps to cope with the insect, even when occurring in injurious numbers, that has characterised the attitude of all but a few growers until recently, are the chief explanations to account for the formidable bug population infesting so many of the orangeries of the district with the evils attending its presence. It is being made a matter for consideration with us as to how far this absence may be remedied.

CONTROL MEASURES.

At this early stage in the investigation, control measure can only be generally indicated, as it was found that our visit was not suitably timed for the prosecution of the necessary experimental inquiry, although the means for conducting this had been secured.

Eggs.

These are very difficult to destroy; the nature of their shells renders them almost impervious to fluids, and their spherical shape and polished exterior serves to shed any fluid sprayed upon them. Ones that had been coated with lime-sulphur have been found to be still alive. Further, the fact that the batches occur for the most part on the under leaf-surfaces principally of young leaves, and although really numerous at times (but always very few indeed as compared with the number in which leaves constituting the entire foliage occur), it is doubtful, even if our experiments did indicate any effective spray, its use would be economically justified, especially as the deposition of these eggs may extend in the case of any one tree over several days at least, and, therefore, more than one application would be required for their destruction.

No great difficulty has been experienced in finding these eggs, although always leaf green, and added experience would no doubt lead to further efficiency in this respect. Every batch of eggs destroyed accounts for fourteen young bugs killed also, as usually 100 per cent. of these hatch out. It may be then, that there will be special circumstances when bug-egg collecting will be fraught with material results, even if promoted by the offer of a small bonus to meet the cost of the undertaking.

Early Larval Stages (First and Second).

Stage I.—The young larval described previously may be readily killed by any of the ordinary contact remedies if once brought in relation with them. However, except for this fact, the remarks made under "Eggs" will apply. But, of course, *their* collection is out of the question. Moreover, the difficulty of reaching them is enhanced by the fact that the very least disturbance causes them to voluntarily precipitate themselves to the ground. As they occur upon the outside of the trees, striking these with branches or any of the methods used in bringing down older larval Orange-tree Bugs might be availed of, especially if the ground beneath the trees were kept bare of herbage. The results following such a course, if alone undertaken, would, however, not appear to be likely to be very material in subduing the pest.

Stage II.—During No. II, Stage it is unlikely that any process can be brought to bear on the destruction of the insect. It can with difficulty be caused to drop, if at all, and it occurs distributed over the entire tree, and is small and most inconspicuous.

Later Larval Stages (Third and Fourth).

It is during the third and fourth life phases of the insects' growth when still young and not exhibiting either wings or wing-covers that measures of control can most effectively be entered upon. Then the Orange-tree Bugs are conspicuous objects by reason of both their size and colour—yellow and yellowish-red—and they readily fall on the trees being "beaten" or "banged."

The effectiveness of any contact spray diminishes as they grow older, and their skins become less pervious to this class of insecticides, so also with regard to measures that may be termed mechanical. The older the insect is then, with respect to these stages, the greater is the tenacity with which it clings to its host, and the greater the corresponding difficulty in bringing it to the soil after releasing its hold. When oldest it is of a bright-pink colour.

The insect was practically absent at the time of this initial inquiry, and so was not available for figuring in tests involving the use of special reagents that were at the time at our disposal. It is, however, very desirable to ascertain the efficacy of insecticides containing Derrine, and steps had been taken to already to do so then.

This investigation has to be, therefore, unavoidably postponed.

In the fifth larval or nymph stage, when the insect possesses conspicuous wing-covers of a green colour, much more convex or distended than before, it is then increasingly difficult to cope with, even by much mechanical means, as it is very tenacious, comparatively speaking, in its hold on the plant.

"Banging," "Beating," or Mechanical Procedures.

The efficacy of this procedure depends upon other conditions governing its successful adoption on the following requirements:—

- (1) It must be conducted when the insect is the more readily brought down (*see* above, "Later Larval Stages"). Otherwise, if deferred, say, until the insect is already adult and endowed with wings, not only will poor results be obtained, but insects will be left to repair to neighbouring orangeries to those of the scene of operations, either forthwith or subsequently.
- (2) The procedure must be carried out in such a manner as to occasion the utmost sudden jarring of the trees without in any way injuring them. This method is the one well known, generally speaking, to entomologists, and necessitates striking the branches one by one, climbing the trees for this purpose, if necessary.
- (3) The possibility of preventing access to the trees on the part of the Orange-tree Bugs brought down must be prevented.

The Morris System.

In developing these requirements, and inasmuch as the visit was not timed to admit of special experiments being entered upon, it will meet the purposes of this report if a system be described that has been elaborated, after much enlightened consideration, by Mr. H. Morris, who is almost singular in Blackall Range citrus growers in keeping in close contact with this office, and who was deputed to arrange the details of this local inquiry.

Mr. Morris has devised a special stout beater, measuring about 18 inches long, made of a certain tough wood. Nearly two-thirds of this is occupied with the well-shaped handle, somewhat curved, that balances the terminal part and admits of a good hand-grip. The terminal portion which is brought when beating in contact with the wood is squared, with one face, however, left flat, the others rounded off. Around this part of the beater is tightly fastened a piece of discarded motor tyre rubber for its entire length, the ends nailed in apposition, opposite the squared side. The rubber in passing over the latter, which admits of an air space, forms a sort of cushion which secures impact with the bark in striking with the avoidance of injury. The figure of the handle has reference to the position of the air-space. In practice, an operative climbs up inside the tree and suddenly bangs the leading branches, and then secondaries one after another, until all have thus received a shock. Of course, the soil beneath the trees should be bare to receive the insects that this action causes to be precipitated upon it.

Mr. Morris's scheme also provides for a device for preventing the fallen insects from climbing the tree trunks and repairing to their former feeding grounds as they are

wont to do, and also causing them meanwhile to congregate so that they can be scooped up and destroyed.

This is effected by placing a band around each tree at a few inches above the soil-surface composed of some special grease-proof paper, and on this grease itself is put after it is fixed in position.

This serves the purpose of causing the insects that have been brought down, sometimes as many as 800 from a single tree, to mass together after some time beneath it, as it is a barrier to their progress; and, thereafter, they may be scooped up with a piece of tin and dropped into a vessel containing lye or other lethal fluid.

Adult Insects (Winged).

These when congregated on the terminals of branches or in some such situations, especially when the sexes are together, cannot, of course, be captured in this manner. In capturing them I have recommended a net-like apparatus and a long stick padded at the striking end. The apparatus is composed of one "net" within another. The outer one may be of stout calico with the end capable of being opened by untying a string; the inner—shorter—one to be funnel-shaped and made of tin with the stem placed downwards, the outer edge forming the net margin instead of the usual ring. This, moreover, has a ferrule for a handle fastened on obliquely so as to admit of the mouth of the apparatus being held just under the little congregations of insects. These, on being beaten by the padded stick (or rather the end of the branch on which they occur being so treated), fall into the inner net and through the funnel into the outer net, whence they cannot escape. I have also suggested the possibility of destroying the adult insects under the circumstances referred to with bailing water (Mr. H. Morris on his part suggests steam as a modification), but neither of these (and both promise to be feasible) has yet materialised even to the experimental stage.

Use of Parasites.

Inability to discover any parasite at present associated with the Orange-tree Bug in the portion of the Blackall Range citrus-growing area examined, and therefore any controlling influence exerted by their agency, whilst pointing to the fact that the insect originally came to the district in a winged state from a scrub separated by a distance from it, too extended to be readily traversed by its foes of this description, and could therefore develop its inherent powers of increase to the fullest limits (hence its numbers), at the same time points to the expediency of investigating the *Oncoscelis sulciventris* in its native haunts—(1) with a view to the detection of such of its parasites as might be expected to occur there; and in so doing, if practicable (2) transferring them to the newly-colonised territory of their proper host, where, being confronted with the latter, a material lessening in the number of these pestiferous insects should result from their presence and habits of life.

Co-operation Effort.

The coping with this insect demands as a *prime consideration* concerted action carried out at one time on well-considered lines. Such a scheme I formerly devised for coping with the Sugar-cane Grub pests of the North, and whose adoption has been attended with such marked success wherever pursued. It is beyond the scope of this report to further enlarge on this necessity, but no effective co-operative work can be inaugurated without a leader in the movement possessed not only of enlightenment but with energy and enthusiasm. Such concerted effort can be secured under the laws, but a well-conceived voluntary co-operative enterprise would, as experience in the above-mentioned connection indicates, far exceed any action that was enforced by the threat of penal provisions to meet the case of defaulters.

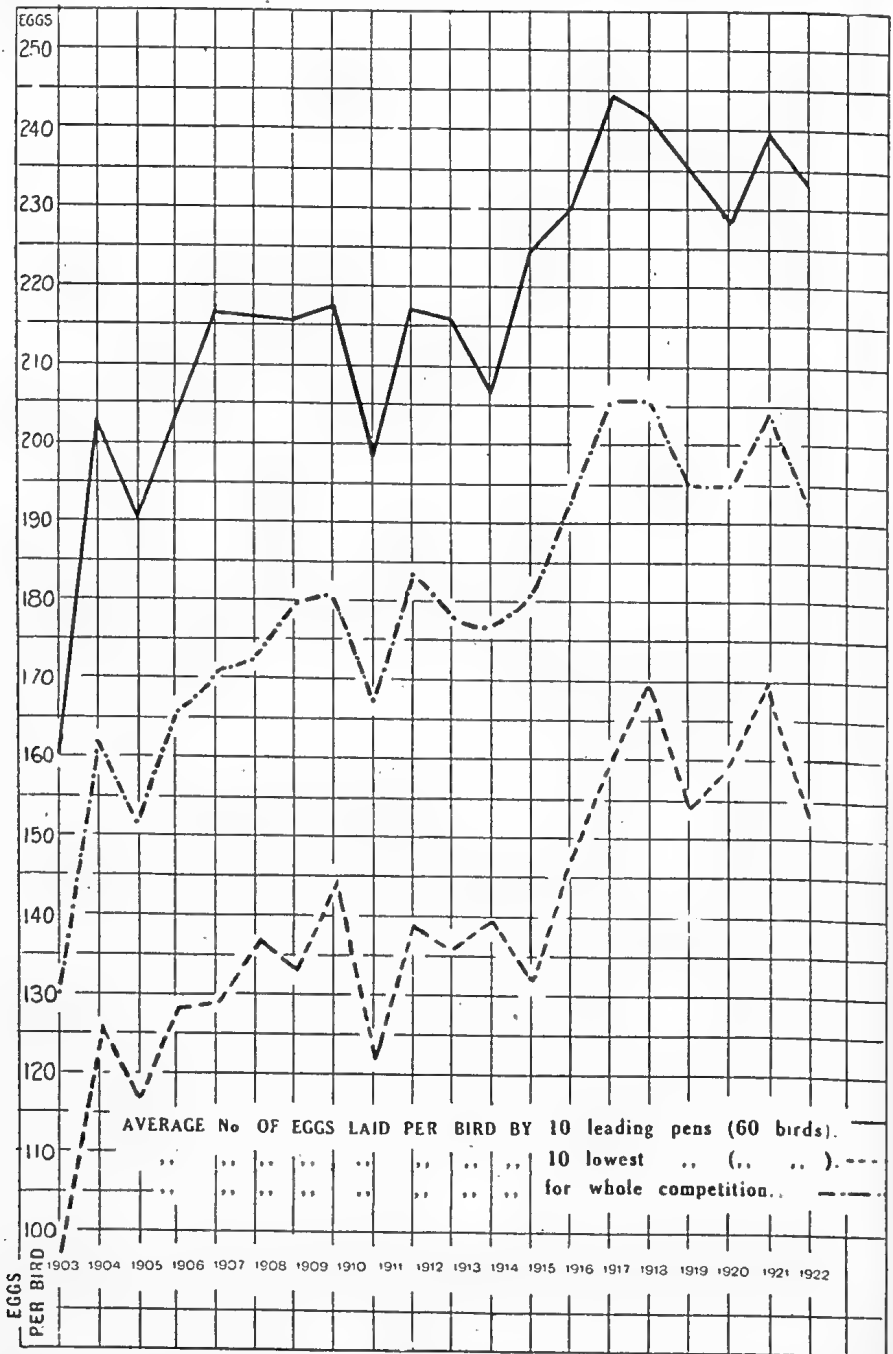
Obligations.

I have to especially confess my obligation to Mr. J. F. Power and Mr. A. Morris, of Flaxton, for very material assistance in prosecuting this inquiry, as well as to the junior members of my staff.

POULTRY SELECTION AND BREEDING.

This graph (from the "Agricultural Gazette of New South Wales") illustrates very clearly the excellent results to be obtained from careful selection and breeding. The diagram, which has been compiled from the records of the egg-laying competitions at Hawkesbury Agricultural College extending over twenty years, is self-explanatory. The full black line shows the average in each year of the 10 leading pens, totalling 60 birds—not necessarily the best 60 birds, as in the early years of the competition the birds were grouped in pens of six,

and it was not possible (as now) to pick out the 60 birds that actually laid best. For the same reason the lighter line shows the average of the lowest pens, but not necessarily of the poorest birds. The diagram shows up very strikingly the following points:—(1) The greatly increased egg-production of all sections—leading pens, lowest pens, and average for whole competition; (2) the average of the lowest



pens is now higher than that of the whole competition in the earlier years; (3) the average for the whole competition is now higher than the average of the leading groups in the early years. The most pleasing feature of the record is that the improvement, except for seasonal and other explainable causes, has been continuously progressive.

NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION COMPETITION, ZILLMERE.

Two thousand two hundred and thirty-five eggs were laid in this competition during the month of December, being an average of 18.625 per bird. There have been no cases of sickness in spite of the hot weather, but a few birds have been broody, thus reducing slightly the average score.

Pen No.	Owner.	Dec.	Total.	Pen No.	Owner.	Dec.	Total.
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WHITE LEGHORNS.

2	A. Niel ...	28	233	30	A. S. Walters ...	17	173
29	A. S. Walters ...	21	224	36	Parisian Poultry Farm	22	173
43	J. J. Davies ...	27	223	48	M. J. Lyons ...	13	170
66	A. Cowley ...	25	215	17	R. Shaw ...	18	170
64	G. Trapp ...	26	211	18	R. Shaw ...	25	170
62	H. Sturman ...	24	207	57	M. Newberry ...	20	168
19	L. Andersen ...	16	205	23	M. H. Campbell ...	30	168
27	Oakleigh Poultry Farm	23	205	41	G. Williams ...	21	167
7	J. Harrington ...	23	205	51	F. R. Koch ...	23	167
34	J. Purnell ...	25	205	56	W. H. Lingard ...	24	167
70	J. Hodge ...	27	202	37	Carinya Poultry Farm	23	166
72	Enroh Pens ...	22	200	73	A. F. Knowles ...	19	163
33	J. Purnell ...	12	200	8	J. Harrington ...	20	163
12	J. Potter ...	18	199	76	A. J. Bourne ...	17	160
77	Kelvin Poultry Farm	19	199	22	E. Stephenson ...	20	160
25	P. F. Adams ...	22	199	20	L. Anderson ...	21	160
61	H. Sturman ...	22	196	14	J. Hutton ...	23	155
63	G. Trapp ...	25	196	16	T. Flood ...	13	155
39	P. J. Fallon ...	25	195	82	E. C. Raymond ...	12	153
53	A. W. Ward ...	26	194	65	A. Cowley ...	16	149
68	R. D. Chapman ...	19	192	80	W. Bliss ...	24	148
79	W. Bliss ...	24	190	11	J. Potter ...	21	148
13	J. Hutton ...	26	190	5	Wambo Poultry Farm	20	146
44	J. J. Davies ...	24	189	81	E. C. Raymond ...	20	146
55	W. H. Lingard ...	22	188	78	Kelvin Poultry Farm	25	144
52	F. R. Koch ...	24	188	31	R. H. Woodcock	19	142
47	M. J. Lyons ...	17	183	3	W. Becker ...	25	142
24	M. H. Campbell ...	20	182	71	Enroh Pens ...	19	139
58	M. Newberry ...	23	182	45	H. Needs ...	16	138
67	R. D. Chapman ...	24	182	15	T. Flood ...	16	135
10	P. Ruddick ...	24	182	59	C. Pickering ...	2	133
46	H. Needs ...	24	181	60	C. Pickering ...	9	132
49	R. Turner ...	23	179	69	A. Hodge ...	11	128
6	Wambo Poultry Farm	21	178	50	R. Turner ...	11	126
40	P. J. Fallon ...	25	178	74	A. F. Knowles ...	0	123
54	A. W. Ward ...	26	178	75	A. J. Bourne ...	23	121
26	P. F. Adams ...	26	178	4	W. Becker ...	16	120
42	G. Williams ...	22	177	21	E. Stephenson ...	22	112
38	Carinya Poultry Farm	8	177	32	R. H. Woodcock	17	108
9	P. Ruddick ...	17	174	28	Oakleigh Poultry Farm	0	107
35	Parisian Poultry Farm	20	174	1	A. Niel ...	13	17

**NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION
COMPETITION. ZILLMERE—*continué*.**

Pen No.	Owner.	Dec.	Total.	Pen No.	Owner.	Dec.	Total.
BLACK ORPINGTONS.							
96	R. A. Boulton ...	21	216	86	Kidd Bros. ...	14	155
92	C. C. Dennis ...	26	214	83	J. Hutton ...	5	154
88	W. A. Blake ..	25	213	102	Parisian Poultry Farm	12	150
107	E. Walters ...	14	197				
93	E. F. Dennis ...	18	194	81	J. Hutton ...	14	150
91	C. C. Dennis ...	24	189	109	Wambo Poultry Farm	16	148
108	E. Walters ...	23	188				
95	R. A. Boulton ...	19	187	112	A. Niel ...	26	145
105	H. Pearce ...	19	183	90	T. Brotherton ...	3	140
89	T. Brotherton ...	28	176	106	H. Pearce ...	12	140
101	Parisian Poultry Farm	18	174	99	L. J. Prichard ..	0	128
				110	Wambo Poultry Farm	13	127
103	J. Potter ...	20	171				
111	A. Niel ...	23	167	98	Enroh Pens ...	18	125
100	L. J. Pritchard ...	4	158	97	Enroh Pens	24	118
87	W. A. Blake ...	19	158	94	E. F. Dennis ...	3	103
104	J. Potter ...	13	156	85	Kidd Bros. ...	0	10
OTHER BREEDS.							
120	T. J. Carr ...	23	178	115	G. and W. Hindes	10	129
118	J. H. Jones ...	24	174	117	J. H. Jones ...	0	120
116	G. and W. Hindes	12	162	113	Parisian Poultry Farm	10	120
119	T. J. Carr ...	23	159				
114	Parisian Poultry Farm	18	144				

CALIFORNIAN METHODS OF POULTRY RAISING AND MARKETING—II.*

In view of the widespread revival of interest in the poultry industry the subjoined article, the first instalment of which appeared in the January Journal, reprinted from the Journal of the Ministry of Agriculture, United Kingdom, and compiled from a Consular Report, will be regarded as of exceptional relevancy.—Ed.

Co-operative Marketing.

The Poultry Producers of Central California Incorporated, is an organisation typical of many in California designed to assist the farmer in marketing his produce in the most effective and economical way, and at the same time to obtain for him the best and most stable price possible.

It is proposed first to outline the methods employed at the Petaluma egg-depôt itself, and afterwards to indicate the co-operative principles upon which the organisation is built.

The depôt consists of a large rectangular building of one story, situated near the railway station, and having sidings and loading platforms along both sides, a third platform being provided at one end of the building for the convenience of automobiles.

Methods Employed.

Eggs are delivered in boxes of thirty dozen each from the railway truck, or, if the farmer lives in the vicinity, from his motor car. The quantities marked on the card attached to the box by the farmer are compared with those entered on a

*From a report drawn up by H.M. Acting Vice-Consul at San Francisco and communicated through the Department of Overseas Trade, U.K.

card inside the box, which is then re-nailed lightly. The boxes are stacked upon a small platform very much like a sled and sent to the re-sorting men upon an ingenious four-wheeled trolley. This is run underneath the loaded sled and jacked up by a single movement so that the sled runners are clear of the ground. Piles of boxes are kept upon the sleds so that they can be conveniently moved at any time with very little labour, and with practically no risk of breaking the eggs. The boxes have already been marked by the farmer according to the grade of eggs which they contain. If a box contains eggs of more than one grade they are re-sorted and made up into full boxes by the re-sorters.

The complete boxes are then inspected to ensure that their contents reach the standard required for the grade. The eggs, which are packed in cardboard frames of three dozen each, are transferred in one movement to somewhat similar metal frames running on a grooved table. They are swiftly looked over by experts who pick out any which are over or under size, dirty or of a bad colour. The frames are pushed along the table by the inspectors and the eggs are re-packed in boxes as they reach the end, the wire frames being shut up and returned along an overhead rack.

The repacked boxes are nailed up on the spot and removed on the sleds above described for shipment.

A Simple and Effective Grading Process.

The extreme simplicity and effectiveness of this grading process is due almost entirely to the education of the individual farmer in the methods of the institution. The great majority of the members can be trusted to grade their own eggs with considerable accuracy, and the inspection is actually only necessary to ensure a standard common to all the consignments and to detect occasional errors.

For the same reason, candling is very little done, except in the case of new members or for other special reasons. All the farmers whose eggs pass through the depôt are themselves members, and realise that care on their own part is necessary in order to dispense with more elaborate arrangements, the expense of which would devolve, ultimately, upon themselves.

The above process is extended in the case of dirty eggs and of eggs for preserving. The dirty eggs are placed upon an endless band of rubber-covered rollers which is passed beneath a funnel emitting a sand blast. As the rollers cause the eggs to revolve they are thoroughly cleaned without the deleterious effect caused by water.

The eggs for preserving are placed upon wire frames similar to those used by the inspectors and immersed for a second or two in oil which is kept at a temperature of 250 degrees Fahrenheit. This has the effect of driving out the air and of sealing the egg, thus rendering it capable of preservation for some months. It may be noted in passing that members are expected to send only sterile eggs to the depôt.

After the completion of the various processes, the boxes are stacked according to the grade of eggs which they contain and loaded on to barges for shipment to San Francisco, or on to railway wagons if for shipment by land.

Individual Care a First Constituent of Co-operation.

It will be noted from the above that the association does little beside co-ordinating the efforts of individual farmers. It in no way relieves them of the responsibility of delivering their eggs in the best possible state for marketing. If the grading and packing work at the depôt runs smoothly, it is because the farmers themselves have taken great pains that it should do so, by performing their own task as efficiently as possible. This is a point of some importance, as indicating the value of individual care as a first constituent of co-operation.

It might be thought that, since only some 65 or 75 per cent. of farmers in the district are members of the Co-operative Marketing Association, its usefulness was problematical. Actually, the proximity of Petaluma to the markets of San Francisco and the Bay Cities adjacent thereto makes it a simple matter for many farmers to make contracts for the sale of their eggs without having recourse to the association: it is when the industry outruns its local market that such a society becomes necessary. In short, though a prosperous co-operative society may be regarded as a criterion of the success of an industry, it is a result of success rather than its cause.

Constitution of Societies.

The question of the constitution of co-operative societies has received much attention in California. Such societies are to be regarded as accessory to the individual in his business, and not as profit-making concerns. They are to provide assistance to

the farmer in proportion to the size of his business through them, and to ensure that none but he and his associates have the controlling interest. The constitution of the Poultry Producers of Central California Incorporated, follows the main principles which have now been accepted in this country as essential for *bonâ fide* co-operative concerns. The initial capital is supplied by local poultry farmers, and subsequent issues are governed by the size of the applicant's poultry ranch—i.e., he can only be allotted one 10.00-dollar share for every 1,000 hens or majority fraction thereof owned by him. Since he must, upon joining, sign an agreement to sell and deliver to the society all the eggs and poultry which he markets, it will be seen that the stock is fairly equitably divided.

The society is governed by a board of eleven directors, all of whom must themselves be poultry producers. An exception is made in the case of one of the directors, who is nominated by the State Market Director of California. There is an Executive Committee of five directors, and a salaried general manager. In addition to the usual annual accounts, the society issues a monthly auditor's financial statement showing the assets and liabilities, and the volume of business and operating costs during the month in question.

Methods of Selling.

The society sells the eggs at the best price it can get, and hands over the proceeds at the average price for the week to the producer, less the cost of the egg-boxes and certain other expenses. These include transportation, and a charge not exceeding 1 cent per dozen eggs for operating and selling expenses. At the end of the fiscal year a reasonable amount is put aside for reserves, dividend, advertising, &c., and the balance of the surplus, if any, is divided among the members according to their deliveries.

In addition to this, 1 cent per dozen is deducted from the selling price of the eggs handed to the producer, and placed to his credit towards the purchase of further shares. As soon as 10.00 dollars is made up in this manner the producer is given a further share in the society. This procedure will, however, cease as soon as the authorised capital has been paid up.

In times of plenty, the society, at its discretion, places a proportion of the eggs delivered in store, paying the producers at the end of the week at the current market price. When it is considered wise to sell these, the producers generally are credited with the further profit made, or debited with the loss incurred should storage and insurance absorb the profit. This second transaction is, of course, between the society and those producers only who made deliveries during the week in which the eggs were put in store.

The society has the right to send eggs to any market which it may consider advisable, and in that case is considered to have bought the eggs at the current market value at the time of shipment. The profit or loss on these transactions is, however, credited or debited to the general corporate fund, and not directly to the producers.

This Central Californian Society has not considered it yet necessary to apply co-operative methods to the marketing of poultry, but should it decide to do so, the members, after ten days' notice, are bound to begin delivering their poultry for marketing to the society as they now do their eggs.

These are only main points in an organisation typical of many which exist for the marketing of various agricultural products in California.

Business Principles Necessary.

It is thought that American methods could profitably be studied by poultry farmers in the United Kingdom. This is not to say that imitation of particular methods is all that is desirable, or that such imitation would, in fact, revolutionise the British poultry industry. The main point is the necessity of business principles in the building up of a prosperous industry. These have been applied with such conspicuous success in the United States, and notably in the district referred to above, that persons interested in the industry would be well advised to make a close study of these principles and the methods to which they have given rise. In particular, the spirit of co-operation and a certain financial courage, when allied with individual hard work and enterprise, would appear to be the main desiderata for success. When it is realised that so compact and successful a community as that of Petaluma has grown up in a State the size of England, but with only one-tenth the number of inhabitants, the possibilities of the poultry farming industry in the United Kingdom, where so tremendous and convenient a market exists, would seem to deserve exploitation to the fullest possible extent.

“ THE PURE SEEDS ACT OF 1913,” AS AMENDED BY “ THE PURE SEEDS ACT AMENDMENT ACT OF 1914.”

BY F. F. COLEMAN, Officer in Charge, Seeds, Fertilisers, and Stock Foods
Investigation Branch, Department of Agriculture and Stock.

The abovementioned Acts are intended to regulate the sale of seeds for planting or sowing—that is to say, all vendors of seeds must comply with the Acts and Regulations thereunder.

Samples for Examination.

In order to ascertain if seeds comply with the Acts, samples may be submitted to the Department of Agriculture, Brisbane, for analysis. It is of the utmost importance that the samples be drawn by the sender from the seed in his actual possession, care being taken to obtain a small quantity from each bag, carefully mixing them together in order to make the sample truly representative of the bulk.

Weight of Samples.

All samples of seed sent for analysis must not be less than the weights herein set out, and in the case of seeds containing foreign ingredients double the weight mentioned should be sent.

Wheat, Oats, Barley, Maize, Rice, Rye, Cowpeas, Tares,
Peas, Beans 8 oz.

Lucerne, Clover, Sorghum, Sorghum Sudanense (Sudan
grass), Setaria (Foxtail millet), Japanese millet,
White panicum, French millet, Linseed, Canary,
Prairie grass, Buckwheat, Cotton 4 oz.

Rhodes grass, Paspalum dilatatum, Rye grass, Cocksfoot,
Couch grass 2 oz.

All agricultural seeds other than those included above . . 2 oz.

Marking of Samples.

Before sending any samples care should be taken to see that the following particulars are plainly written thereon in ink:—

- (1) Kind of seed.
- (2) Quantity the sample represents.
- (3) Marks on bags or grower's name.
- (4) Name and address of sender.

Unless these particulars are plainly written on the sample delay will ensue.

When the information is required for commercial purposes a fee of 2s. 6d. per sample is charged, which fee should be enclosed with the covering letter advising of the despatch of the sample. All samples, with covering letter, should be addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane.

The official reply is sent in the form of a report or certificate, which gives the percentages of purity and germination, also the percentage of the various foreign ingredients that the sample contains.

“Purity” means the percentage by weight of pure seed that the sample contains, and the term “Pure seeds” means the seeds of which the sample purports to consist after the impurities or foreign ingredients, as defined below, have been eliminated; but, in the case of those species, kinds, or strains of plants, the seeds of which cannot be distinguished from one another by expert examination, the use of the term “Purity” does not imply that the seed is genuine or true to name.

“Germination” means the percentage, calculated by number, of pure seeds as defined above which germinate during a germination test.

“Foreign ingredients” or impurities include inert matter, seeds of weeds, or seeds of any plant other than the seed in question, or dead, diseased, insect infested, non-germinable, or hard seeds.

“Inert matter” includes broken seeds less in size than one-half of a complete seed, or chaff, dust, stones, or any material other than seeds.

“Hard seeds” mean any seeds whose seed coats are so impervious to water as to delay germination.

FORM OF CERTIFICATE.

A certificate of analysis gives the following particulars:—

Calculated by Weight.	Calculated by Number.
Purity (or Pure Seeds) per cent.	Germination per cent.
FOREIGN INGREDIENTS.	
Inert matter per cent.	Hard Seeds per cent.
Seeds of weeds or seeds of any kind,* other than that to which the sample purports to belong	Dead and non-germin- able seeds
.....per cent.	.....per cent.

* The principal seeds are (names of weed seeds, &c.).....

Unless the sender is careful to forward a truly representative sample the certificate is valueless. Under no circumstances is it a guarantee by the Department of Agriculture as to the bulk, but an analysis of the sample received, giving a plain statement of its condition at the time when such analysis was made.

Invoice must be given by Vendor.

On the sale of any seeds of not less value than one shilling the vendor must give to the purchaser an invoice stating that the seeds are for planting or sowing, the kind or kinds of such seeds, and that they contain no greater amount of foreign ingredients than is prescribed.

The actual wording on an invoice should be—

“The seeds mentioned on this invoice are for planting or sowing, and contain no greater proportion or amount of foreign ingredients than is prescribed for such seeds.”

Definitions of “Vendor” and “As grown.”

A vendor is any person who sells, or offers or exposes for sale, or contracts or agrees to sell, or deliver any seeds. In other words, an Auctioneer, Storekeeper, Produce Merchant, Seedsman, Grower of the seed, or any other persons, are vendors whenever they sell or offer for sale any seeds as seeds for sowing. Section 6 of the Regulations provides for the sale of “As grown” seeds to seed merchants to be cleaned and graded by the merchant before being offered for sale as seed for sowing. The sale by farmers of “As grown” seeds is therefore limited to such merchants as are in possession of one or more efficient seed-cleaning machines. A farmer is a vendor under the Acts whenever he sells to another farmer or to any other person, and must give an invoice, as required by the Acts. The only exception is the sale of “As grown” seeds to merchants for cleaning and grading.

Prescribed Standards and "B" Grade Seeds.

The percentage of weed seeds, inert matter, dead and non-germinable seeds, and other foreign ingredients that may be contained in the different kinds of seeds are prescribed by the Regulations, copies of which may be obtained from the Department of Agriculture.

"B" grade seeds are seeds in which the amount of foreign ingredients exceeds the proportion set forth in Schedule A of the Regulations, but does not exceed the proportion set forth in Schedule B, such seeds may be sold as seeds for sowing, providing they are contained in bags or packages to each of which is affixed a label, brand, or stamp, clearly and indelibly marked, specifying: The kind or kinds of such seeds; that the seeds are "B" grade, for planting or sowing, and contain no greater proportion or amount of foreign ingredients than is prescribed; also the name and address of vendor. All invoices relating to such seeds must be distinctly marked "B" Grade Seeds.

Every purchaser should know the purity and germination of the seed that he intends to buy or sow; also its freedom from diseased or insect-infested seeds. These matters can only be decided by a thorough examination of a large and truly representative sample drawn from the actual bulk in the sender's possession. Seeds constitute the most variable material that the farmer or merchant purchases, and the success or failure of a crop, or even succeeding crops, may be wholly determined by the kind or condition of the seed sown. No one can afford to leave any doubtful point to chance, and it is but common prudence to ascertain the purity and germination of all seeds purchased before sowing or offering them for re-sale.

Free Analysis for Farmers—Better Seeds mean Better Crops.

In buying let quality be your guide; the best is never too good. No charge is made to farmers sending in samples of the seeds that they have purchased for their own sowing, providing the following particulars are plainly written on each sample:—

- (1) Vendor's name and address.
- (2) Name of seed.
- (3) Quantity purchased.
- (4) Date of delivery.
- (5) Locality where seed is to be sown.
- (6) Name and address of purchaser.

Although buyers and sellers are able to form a good idea of the market value or price, experience shows that they are frequently misled as regards purity and germination. It is impossible to determine the amount of weed seeds, non-germinable seeds, hard seeds, or inert matter other than by a purity analysis and germination test conducted under uniform scientific methods. Any opinion as to the quality or condition of any agricultural seeds is useless unless based on the examination of a truly representative sample. This work is undertaken by the Seed Laboratory of the Department of Agriculture.

Before sending any samples, care should be taken to see that the required particulars are plainly written thereon in ink.

COVERING LETTER.—All samples, with covering letter, should be addressed to—

The Under Secretary,
Department of Agriculture and Stock,
Brisbane.

SUGAR: FIELD REPORTS.

The Southern Field Assistant, Mr. J. C. Murray, reports under date 3rd January, 1923, as follows:—

Maryborough.

Cane is looking well in this district and acreages are gradually being extended. There is still a fair amount of land outside Maryborough that could and probably will be planted provided the price of sugar is sufficiently encouraging. This applies in a large degree to that tract of forest country that is lying between the city and Tiaro, where, excepting for frosted places, quite a lot of cane could be grown.

The varieties mentioned in the previous reports as making favourable progress are still doing well, while ratoons cane are making a good showing. It is probable here, as well as in other districts, that the farmers would get better tonnages from ratoons if they studied ratoon fertilising in suitable weather. Very often a ratoon crop which turns out a partial failure would have been a success had, say, judicious application of mixed fertilisers been used. Farmers are recommended to increase the humus content of the soil by green manuring. They are also recommended to remove useless and discarded varieties from their farms, as these only act as hosts for insect parasites and injurious bacterial agencies.

Pialba.

Farmers have had good rains, and the young crops, plant and ratoon, look forward and healthy. Cane growers are paying more attention to scientific methods of production, and the result of this is observed on some of the plant cane and the appearance of the soil, which has been rendered friable by intensive cultivation and the use of lime. Great credit is also due to these farmers who have variety plots, for the care and discrimination with which they are looking after them. Cane varieties at present looking promising are Q. 813, E.K. 1, E.K. 28, Shahjahanpur No. 10, M. 1900 Seedling, and Demarara 1135. J. 247 is also making a good showing.

Liming has been conclusively proved successful on a typical Pialba soil, and one progressive farmer has had good results from the use of 2 cwt. meatworks, 2½ cwt. sulphate of ammonia, 2½ cwt. sulphate of potash, and 3 cwt. superphosphate. This mixture was applied with positive results. The soil, however, was a little better than a typical Pialba soil, that is to say, the texture was probably better. Guano has also been used on the same soil but with no positive results, until the ratoon crop, and then it was noticeable where the ½ ton per acre of guano had been placed.

Mount Bauple.

There is every prospect of a good season at Bauple next year. Splendid rains have fallen, in some instances a little too heavy, causing washaways in places, but, on the whole, the district has benefited greatly. The young plant cane and ratoon are very healthy and forward, showing no disease or evidence of parasitic attack. The farmers are busy keeping down weed growth and cultivating, the latter being very necessary to ensure against evaporation and caking of soil after the heavy rain. Farmers here are recommended to eliminate discarded varieties as much as possible, and only grow canes likely to develop into economic growth. There is little to comment upon since last visiting Mt. Bauple. The Shahjahanpur No. 10 is making a good showing and should do well in the district. Other canes making good progress include E.K. 1 (this variety looks particularly well), E.K. 2, E.K. 28, H. 109, Q. 970, M. 1900, and Q. 813. Reintroduced D. 1135 and M. 189 are canes that are making a very good showing also.

The Northern Field Assistant, Mr. E. H. Osborn, reports under date, 4th January, 1923:—

Proserpine.

At the time of my visit this area was suffering severely from the effects of dry weather, and consequently 1923 prospects were not too encouraging.

Very little of the November rain that fell at the Burdekin reached the Proserpine area, with the exception of Kelsey Creek and Banana Pocket. These districts had probably 1½ to 2 inches, against about half an inch in the other parts. Up to the end of November 37.39 inches of rain only had been recorded at the mill, which is a very big decrease below the general average rainfall.

34,167 tons of cane had been crushed for an average of 14.95 c.e.s. Some 4,610 samples were taken on an average of one for every 7.4 tons of cane. Below is a list giving particulars of the cane put through the rollers:—

Variety.	Average c.e.s.	Per cent. of crop.
H.Q. 426	15.6	26
Q. 813	15.5	9
B. 147, B. 208, Q. 1121, Q. 114, and Q. 116	15.5	3
Badila	15.4	10
M. 1900	15.2	5
Mixed varieties	14.4	12
Goru	14.2	13
S. Singapore	14.2	6
D. 1135	14.2	6
Malagache	14.1	10

100 per cent.

It will be noticed that again this year H.Q. 426 is easily the favourite, but is run a good second by Q. 813, whilst the 3 per cent. of B. 147, B. 208, Q. 1121, Q. 114, and Q. 116 are also very high in sugar content.

When the very dry nature of the season is taken into consideration, it is really wonderful to see how well some blocks of plant cane are looking. Most of them, however, are either on or adjacent to the water frontages.

Among those most noticed was a 30-acre block of July plant growing upon Mr. R. Ruge's farm upon the river bank. At Kelsey Creek, Mr. J. C. Edwards has some very fine plant cane, consisting of Badila, M. 190, and D. 1135. His ratoons also show very good growth. This grower has ploughed deeply and often, has scarified continually, and has generally kept his cane in good order.

Probably more cultivation has been put into the Proserpine cane area this year than in any former one, and it is due to such continual work that the cane still holds out so well under such adverse weather conditions.

At Banana Pocket the conditions were very dry, although better than in Proserpine proper. Since my last visit several new farms have been opened up, and there are now twelve or fourteen growers in residence.

Among the cane growing there, Mr. R. Thomas's July plant stood out on its own, being ahead of any cane seen elsewhere in the Proserpine area. It consisted of H.Q. 426, Badila, N.G. 24 and 24 B., M. 1900, and D. 1135, and certainly looked very well indeed. Mr. Thomas said that his average density for twenty-months old plant cane of the above six varieties was 14.6 c.e.s. It is to be hoped that all the available land in this area will soon be under crop, as the Proserpine mill is in need of such cane.

Lower Burdekin (Kalamia, Pioneer, and Inkerman Areas).

Kalamia finished crushing on the 16th December for 70,000 odd tons of cane, and although generally speaking the average density figures were below those of last year, yet in places some high figures were reached. One grower, I am told, had an average of 19.1 c.e.s. for a couple of weeks from B. 208.

Generally, the cane looks well despite the dry weather, and some really nice plots of cane were noticed. Among them was a block of 30 acres plant belonging to Mr. H. Parker (August) of H.Q. 426 and 24 B. This was watered at time of planting and afterwards manured with 4 cwt. of mixed manure to the acre. Nearly a small block of first ratoons (H.Q. 426) had been given the same treatment and was cutting at the rate of 20 tons to the acre. Some extremely nice cane was also noticed upon Messrs. Butterworth's, Wellington's, and Raff's farms.

The lastnamed grower has just added to his steam pumping plant an electric 8-inch pump, worked from the Ayr power-house. Mr. Raff speaks well of this installation.

Pioneer Mill.

This mill put through a total of 93,300 tons of cane for the season, but for a lower density than last year. For next year there is some 3,000 odd acres planted, of which about 60 per cent. has been planted early. This has all struck very well, as has also about half of the late plant. Some of the crops look very well, mainly B. 208, Badila, H.Q. 426 (Clark's Seedling), and the Goru N.G. 24, 24A, and 24B. These varieties certainly grow to great advantage upon the Burdekin soil.

Mr. H. H. Kastener, of Klondike, kindly supplied the following interesting particulars of some cane varieties harvested by him:—

Variety.	c.e.s.	Value.	
		s. d.	
Q. 908	14.0 ..	51 6	} Planted in August, cut early next August.
Q. 855	13.1 ..	47 2½	
Q. 970	12.7 ..	45 4	
Hy. No. 1 ..	15.5 ..	58 7½	
*Q. 813	14.7 ..	54 9¾	} Planted in September, but cut in August (early).
"	15.1 ..	56 8½	
"	14.1 ..	51 11½	
"	15.0 ..	56 3	
"	16.0 ..	61 0	
"	15.0 ..	56 8½	

Home Hill (Inkerman Mill).

The progress of this district during the past twelve months has been remarkable. New and substantial houses are being built in every direction, and the farmers generally are optimistic as regards the future success of their canegrowing operations; that is, of course, if the price of sugar keeps up to a reasonable figure. A large number of the farms are now being supplied with irrigation water, and a number of these interviewed seemed well satisfied.

Another noticeable feature was the very large number of tractors that have come into use since my last visit only six months ago. They are of all types, and are getting over a great deal of ground.

During the crushing just finished at Inkerman mill, some 119,000 tons were put through. Like the other Burdekin mills, however, the density was on the low side. This was caused by the dry weather early in the year. The State Farm records show that for July, August, September, and October only 2.28 inches fell, and of this amount 1.7 inches fell in July. Naturally, with such dry weather conditions, the cane crushed early in the season was badly dried. Going through the areas it was also noted that more attention is being paid to green manuring, liming, and using artificial manures, and most of the growers recognise their value. For instance, Mr. S. W. Gibson cut a 10-acre block of first ratoons, Badila, and N.G. 24B, for a return of 31 tons to the acre. This had been manured with about 6 cwt. mixed manure to the acre. As a plant crop he received a yield of over 40 tons per acre. Last year a first ratoon crop manured with the same quantity of manure gave him a 26-ton yield per acre.

Mr. Gibson uses 2 tons of earth lime per acre and also ploughs in Mauritius bean.

Pests in the Burdekin Areas.

At time of writing the grey-back cane-beetle is very numerous on and about Plantation Creek (in the vicinity of Norham). The Burdekin Canegrowers' Association are fully alive to the danger and are now very busy collecting beetles.

Some big cheques are being made by the various collectors—Mr. Hobson having paid one man £9 for three days' work, paying for the beetles at the rate of 1s. 6d. per quart. Another grower collecting has paid for 1,647 quarts between 1st and 26th of December. The association is to be complimented on the energetic way in which it is trying to minimise the effects of this pest.

In connection with cultivation matters generally, it is pleasing to see how this district is going ahead. Manuring is now being carried out to a very large extent. Quite a large number of growers are also using green manures, and liming is becoming far more popular. Roughly speaking, there are about thirty-six tractors on the Ayr side of the river. Two or three automatic light ploughs are already in use and three more are on order.

As a result of the recent beneficial rains the whole district presents a beautiful appearance, and at present everything points to a splendid season for 1923.

* The Q. 813 was cut from an 8-acre block of medium shallow forest country, and was only ploughed twice, cutting at the rate of 17 tons to the acre. Its c.e.s, however, averaged nearly 16, or very much more than the average c.e.s of the mill for the season.

THE USE OF FERTILISERS IN SUGAR-CANE CULTIVATION.

By H. T. EASTERBY, Director of Sugar Experiment Stations.

The past three years has seen a great increase in the use of manures for sugar-cane, but there are still many farmers who continually deplete their soils without in any way attempting to restore necessary plant foods. Moreover, the higher costs of production, combined with the possibility that we shall see a reduction in the price of sugar, makes it imperative that every farmer shall make it his business to get as much as possible out of his land by more intensive cultivation, proper soil handling, and by the aid of fertilisers where the use of them is indicated. The Sugar Experiment Station has for many years past freely encouraged cane farmers to send in samples of their soils for analyses, and obtain advice thereon, and up to the present upwards of 1,000 sugar soils have been so analysed. Many lectures on manuring have also been delivered by the Sugar Bureau, and particulars have been published in pamphlet form. With the results of soil analyses, letters of instructions as to the treatment of the land is forwarded.

It will be useful before proceeding to deal with fertilising substances to consider how much plant food is removed from the soil by cane crops. This appears to vary a good deal according to the variety grown—for instance, in some experiments carried out in 1915 and analysed, it was found that the three varieties of cane known as H.Q. 426 (or Clark's Seedling), Badila, and Goru, removed in pounds per acre the following amounts of plant foods:—

Name of Cane.	Potash removed. Pounds per Acre.	Phosphoric Acid removed. Pounds per Acre.	Nitrogen removed. Pounds per Acre.
H.Q. 426 ..	137	77	105
Badila.. ..	166	59	109
Goru	91	23	60

It will thus be seen that the constant growing of cane crops on lands where no attempt is made to replace plant foods means the removal of huge stores of mineral matter essential to crops, and the ultimate poverty of the lands. Farming under these conditions has often been compared to a spendthrift squandering his principal.

The Application of Manures.

The manurial elements needed in the growing of successful cane crops are nitrogen, potash, and phosphoric acid. These are usually supplied in the following fertilisers:—

Nitrogen in—

- Nitrate of soda—contains about 15 per cent. nitrogen.
- Sulphate of ammonia—contains about 20 per cent. nitrogen.
- Nitrate of lime—contains about 12½ per cent. nitrogen.
- Nitrolim—contains about 18 per cent. nitrogen.
- Dried blood—contains about 11 per cent. nitrogen.
- Meatworks manure—contains about 3 to 4 per cent. nitrogen.

Potash in—

- Sulphate of potash—contains about 52 per cent. potash.

Phosphoric acid in—

- Superphosphate—contains about 16 per cent. phosphoric acid.
- Rock phosphate—contains about 18 per cent. phosphoric acid.
- Guano—contains about 15 per cent. phosphoric acid.
- Thomas phosphate—contains about 17 per cent. phosphoric acid.
- Meatworks manure—contains about 17 per cent. phosphoric acid.
- Bone dust—contains about 20 per cent. phosphoric acid.
- Basic superphosphate—contains about 19 per cent. phosphoric acid.

Phosphoric acid is found in a readily soluble form in superphosphate, it being practically all water soluble in that material. In the other forms shown above, the phosphoric acid may be partly citrate soluble and partly citrate insoluble.

Hints on Purchasing and Using Manures.

1. Do not take delivery of manures unless they are accompanied by an invoice certificate containing the guaranteed percentage of the article purchased, or, in the case of a mixture, the guaranteed percentages of the different ingredients.
2. Do not accept delivery of bags of fertiliser that are not labelled or branded.
3. It is much wiser not to buy fertiliser of low grade, as you may have to pay freight on a lot of useless material.
4. Always see you obtain the manure you order.
5. Do not give a higher price per ton than the registered price under the Fertilisers Act. This may be seen periodically in the "Agricultural Journal."
6. Do not buy more manure than you intend using, as fertilisers do not improve with keeping.
7. If possible, mix your own fertilisers, as you can vary the proportions to suit your own requirements.
8. Always remember you want to manure the crop, not the land.
9. Prevent bags of fertiliser from getting wet. This always leads to loss, and frequently sets the manure in hard lumps, difficult to break up.
10. Finally, always bear in mind that fertilisers give the best results on well-tilled soils and that they also need moisture in the soil. Applying fertilisers in time of drought is waste of manure.

Under the Fertilisers Act it is required that the dealer shall, at the time of sale or before delivery, give to the buyer an invoice certificate, signed by the seller or his agent, stating the full name and place of business of the dealer; the name, trade mark, brand, or sign used to mark packages containing such fertiliser, and used to identify such fertiliser; the quantity or net weight of fertiliser comprised in the sale; the composition of the fertiliser, setting forth the proportion per centum in which such fertiliser contains the following ingredients:—Nitrogen, phosphoric acid, potash, and lime, and the respective forms in which they respectively occur; and, in the case of bone dust, basic slag, agricultural lime, &c., the percentage of coarse and fine material.

Furthermore, every dealer who sells fertiliser, which term includes offering or exposing for sale and having in possession for sale, shall securely affix to each package a printed label, clearly and truly certifying: The number of net pounds of fertiliser in the package; the figure, trade mark, or sign under which the fertiliser is sold; the chemical composition of the fertiliser, in the same manner as stated on invoice certificate; and the state of fineness for certain fertilisers.

In mixing fertilisers care must be taken not to bring ingredients together which would lead to decomposition or loss of some part of the manure. Thus, should lime be mixed with sulphate of ammonia or superphosphate, loss would result, as it would also if Thomas phosphate were mixed with sulphate of ammonia.

Nitrate of soda is easily leached from the soil, hence it should not be applied during a heavy wet season. It is a great stimulant, and has frequently been found to add such strength and vigour to cane plants that it strongly aids in obtaining other mineral food, such as potash and phosphoric acid, from the natural resources in the soil. Nitrate of soda will often show its effects in a week or two, producing a rich, dark-green colour in the foliage, and cause a marked improvement in the growth of the cane.

Nitrogen, in the form of sulphate of ammonia, is not so quick in action as in nitrate of soda; while nitrogen in dried blood, bone dust, and meatworks is still slower in action, as they require chemical changes to convert them into nitrate so as to become available to the plant.

Meatworks, in the wetter cane areas of North Queensland, is often preferred to superphosphate as being less soluble.

As a rule, considerably more benefit is got from the manuring of ratoons than from the manuring of plant cane, and this experience is common. This is strikingly shown in the following summary of experiments carried out at Mackay:—

PLANT CROP. Tons of Cane per Acre.			FIRST RATOON CROP. Tons of Cane per Acre.			SECOND RATOON CROP. Tons of Cane per Acre.			THIRD RATOON CROP. Tons of Cane per Acre.		
Man- ures.	No Man- ures.	Differ- ence.	Man- ures.	No Man- ures.	Differ- ence.	Man- ures.	No Man- ures.	Differ- ence.	Man- ures.	No Man- ures.	Differ- ence.
50.7	47.4	3.3	42.4	31.7	10.7	38.8	24.1	14.7	35.9	19.8	16.1

The manures applied to the above were nitrate of soda, sulphate of ammonia, superphosphate and sulphate of potash.

It is not recommended that mixed fertilisers should be placed in the drill with the cane plants. As soon as the cane is about 18 inches high, drills 4 to 5 inches deep should be drawn about 10 inches from the cane plants on each side of the row, and the fertiliser advised is put into these drills and then covered, or a manure distributor can be used. Both sides of the row, however, should be treated. If nitrogenous fertilisers alone are recommended, such as nitrate of soda and sulphate of ammonia, they can be applied on the surface of the soil near the cane. Organic forms of nitrogen, such as meatworks and blood manures, requiring the action of soil organisms to render them available, should be placed in drills and covered.

For ratoons the manures can be applied while working the interspaces. They may be dropped in the furrow, ploughed away from the cane, and then covered.

For the continued successful use of artificial fertilisers, the land should not be acid in reaction. Considerable risk is involved in the continued use of manures such as sulphate of ammonia, sulphate of potash, and acid phosphates unless lime dressings have been previously made.

On given soils, particularly some of the red volcanic type, better results from the use of organic fertilisers, such as bone meal, blood manure, meatworks manure, &c., have been realised. Megasse ash, molasses ash, and filter press cake should all be availed of when they can be procured. The latter should be ploughed in some three or four months before the cane is planted, and the same may be said regarding the application of molasses.

Before applying fertilisers it would be wise to send samples of the soil of the farmer (not less than 5 lb. in weight) to the Bureau of Sugar Experiment Stations, Brisbane, for free analyses and advice, accompanied by a form giving full particulars. These forms may be obtained from the office of the Bureau, in Brisbane, but many secretaries of the different Farmers' Associations have supplies.

Advice on the kinds of fertilisers to use, prices, &c., may always be obtained from the Sugar Bureau.

The very best of cultivation must always be used to obtain the best results from fertilisers. A moderate to good rainfall is also essential, as without plenty of moisture, manures lie dormant in the soil and are, indeed, often lost altogether in loose and porous soils.



PLATE 29.—SUGAR CANE.

THE SUGAR INDUSTRY.

Stabilisation Proposals.

Conference Favours Pool.

In response to an invitation from the Government, representatives of the Queensland Sugar Industry met in conference with the Premier (Hon. E. G. Theodore) and Minister for Agriculture and Stock (Hon. W. N. Gillies) on the 23rd and 24th January. The Conference decided in favour of a Pool to control all sugar produced in this State during the next five years; the prohibition by the Commonwealth Government of the importation of black-grown sugar, except so much as might be required to make good any Australian shortage; and the retailing of sugar at a price not exceeding 4½d. per lb. in the larger cities, an agreement to be made between the Pool and the refiners for the refining and distribution of the sugar. It was also decided to place the Conference resolutions before the Federal authorities by delegation. Subjoined is an abridged report of the proceedings.

An important conference to consider the welfare and permanency of the sugar industry of Queensland was opened in the Office of the Minister for Agriculture and Stock (Hon. W. N. Gillies) on the 23rd January, and continued next day.

Mr. Gillies presided. The invited delegates were:—

Standing Sugar Committee of the Council of Agriculture: Messrs. W. J. Short, T. A. Powell, W. G. Batchler, G. H. Pritchard, and C. V. Hives; Australian Sugar Producers' Association: Messrs. A. Adie, F. C. P. Curlew, Senator T. W. Crawford; United Cane Growers' Association: Messrs. G. Johnson, J. J. Castor, W. H. Doherty; Millers' Representative on Cane Prices Board and Representative of the C.S.R.: Mr. P. H. M. Goldfinch; Cane Growers' Central Board: Mr. W. H. Marshall; Millaquin Refinery: Mr. W. R. Hartnell. There were also four visitors from New South Wales, who were permitted to remain as spectators. These were Messrs. Nudgley, Robbins, Ellis, and C. Farlow. Mr. F. M. Forde, M.P., Capricornia, was also in attendance.

The Chairman's Address—Sugar and White Australia.

Mr. Gillies welcomed the delegates. He said they all recognised the benefits of the sugar agreements since 1915, particularly the last one, whereby the industry increased in value by £5,000,000, and 40,000 more acres were placed under sugar than before. Farmers were able to give better attention to cultivation, and the standard of living of the growers improved. It was for the delegates to endeavour to formulate a policy that would enable the prosperity of the industry to be continued in the absence of a Commonwealth agreement. It was their most important industry, and with it was involved the White Australia policy. From 1907 to 1920, Australia imported sugar to the value of £21,000,000, and seeing that we had the land, the climate, and the rainfall, we ought to be producing all the sugar that Australia required. Under a proper system of control it could easily be done, and the benefits resulting from the agreements justified some sort of Government control. They had to face the situation and endeavour to put before the producers, the people of the Commonwealth, and the Federal Government a scheme which would be acceptable, and which would give permanency to the industry and encourage the clearing of more land and the planting of more cane.

Speech by Mr. Theodore—Facing Plain Facts.

The Premier (Hon. E. G. Theodore) then launched his proposals. He said he did not want to exploit the occasion for any purpose, but wished to put forward plain facts concerning the industry and the situation they were up against. He hoped they would set aside all considerations of politics and differences between

Left to Right—

T. A. POWELL.

J. J. CASTOR.

G. JOHNSON.

A. ADIE.

W. H. DOHERTY.

W. M. MARSHALL.

P. H. M. GOLDENFICH.

W. J. SHORT.

Hon. E. G. THEODORE.

Hon. W. N. GILLIES.

A. R. HENRY
(Secretary).

W. H. FRANKLIN
(Stenographer).

C. V. HIVES.

W. G. BATCHELOR.

F. C. P. CYRELEWIS.

W. R. HARTNELL.

G. H. FRITCHARD.

Senator
T. W. CRAWFORD.



PLATE 30.—DELEGATES, SUGAR CONFERENCE, DEPARTMENT OF AGRICULTURE AND STOCK, BRISBANE, 23RD JANUARY, 1923,
HON. W. N. GILLIES PRESIDING.

associations, realising they were there for the one purpose of fixing up some kind of arrangement to ensure reasonable conditions for some years. In that respect they were a single purpose league. The industry was faced with a crisis. Growers, millers, and everyone concerned had of late got into the habit of hiding their heads in the sand; they had refused to look facts in the face. It was useless assuming that there would be a continuance of the agreement. They knew it would not be renewed by the Commonwealth Government. He said that advisedly, so that they could know what the industry was faced with. What, then, was the next best scheme for the good of the sugar industry and the protection of those who had capital vested in it? The industry was exposed to competition with the whole world, save for that small protection through the tariff duty of £9 6s. 8d. That duty was not sufficient to enable the industry to be carried on with a reasonable degree of prosperity: it was relatively no better protection than they had before the first agreement, if it were as good. The extra cost of freights, sacks, and insurance absorbed the difference between the £6 before the agreements and the £9 6s. 8d. now offered. It would be adequate protection if the price of Java sugar would keep up to its present figure, but there was no guarantee of it, and under the circumstances £9 6s. 8d. left them in the wilderness. Mr. Knox himself had told him that if the protection was not increased, and there was no agreement, they were back to the 1913 conditions.

A voice: Slavery.

Stabilisation Necessary.

The Premier: In the course of a year or two the industry would become extinct. He went on to say that the average pre-war price of imported sugar for eight years was £11 17s. 6d. per ton. They might expect to have to again face such a price in the future. What they wanted was not merely a high price to-day, but something like assured conditions for the future, so that the workers, farmers, and millers could have confidence. In whatever action was taken, Commonwealth co-operation was essential, because the principal factor in securing stability was the price which the consumer would pay and the measure of protection from outside competition. He thought they should ask the Commonwealth Government to prohibit the importation of black grown sugar under conditions which the Government would naturally want to dictate.

Pool Proposed.

His proposal was that they should form a pool in Queensland to take over the raw sugar as had been done under the agreements, and to make agreements with the refineries for the refining and distribution of the sugar. The pool would also regulate with the refineries the price to be charged to consumers and retailers through the distributing agencies. The pool, too, would have to manage whatever importations were necessary to make good any shortage, and to make proposals for financing carry over or surplus production. If they had a pool for five years it would give stability, and if the Commonwealth would prohibit importations, it seemed to him that the pool could so arrange that the consumer would not be charged more than 4½d. per lb. for refined sugar.

The Price of Raw Sugar.

The Premier went on to say it might be thought that they were being asked to sacrifice too much in fixing the price for raw sugar at £27, as against the present £30 6s. 8d., but they had to look the facts in the face, and it was no use holding out for the impossible. If they said £30 6s. 8d. was the lowest they could possibly accept they might have to face the extinction of the industry. The main desideratum was stability, and if they get £27 for five years, it must be a good thing for the industry, even if it meant some small sacrifice on the part of the growers and millers. They would have to cut down the costs between the refineries and the mills. These costs had been going up under all headings, and the costs of distribution had advanced enormously. The cost of shipping freights would also have to come down. He was not suggesting a wholesale attack on wages, because, looking at the special conditions of seasonal employment and working under tropical conditions, the wages were not exorbitant; but costs could be cut down in the mills, and possibly in the fields, to enable £27 to be an economic price. Fortunately, once the price of sugar was fixed, the basis of allocation between the miller and the grower was determined by agreement between the parties—an agreement which had been recognised by the Central Sugar Cane Prices Board. He thought it possible that the Commonwealth Government might have to legislate to give effect to the embargo on the importation of sugar.

Senator Crawford: It would be done under the Customs Act.

The Premier: That simplifies the situation.

New South Wales Sugar and the Pool.

In answer to Mr. Powell, the Premier thought there would be no difficulty with the New South Wales sugar if they had a Queensland pool. The other States would have to recognise mutual obligations. He then submitted the resolutions as set out at the commencement of the report.

Asked as to the constitution of the suggested pool, the Premier thought one representative each of the growers, millers, and Government would be sufficient.

Discussing the first proposal, Mr. Pritchard said that if they were going to establish a pool he thought that the C.S.R. Co. should be asked to include in that pool the whole of the product of New South Wales.

Mr. Goldfinch said that he could not commit the company to anything. He did not understand where the pool started and where it finished. The C.S.R. Company was out to help the industry and place its plant at the disposal of the community with certain safeguards and with a moderate return for its investments. In the meantime he would like more details as to where the pool came in and what responsibilities it had.

Establishing the Pool.

Mr. Theodore said that with reference to the representation of refiners, it had been definitely intimated to Mr. Gillies that the C.S.R. representative would not be able to commit himself. The growers and millers were primarily concerned at the conference, and they should be able to arrive at a definite policy and carry it out. If they started to refer the resolutions to the canegrowers' association, &c., it would be Christmas before they arrived at any decision. He could understand the refiners' qualification, because they came into the negotiations subsequently. With regard to the legal entity of the pool, it was simple to lay down the pooling system. In the past the Commonwealth Government had taken control, because in the first instance this State got the ownership by the Sugar Acquisition Act, and passed it over to the Commonwealth. In the same way the Queensland Government could issue a proclamation, acquire the sugar and pass it on to the pool. At no stage could the Government be disconnected from the pool because of the finance, which had to come from somewhere. That being the case, the Government would be directly associated with the pool when it was formed. There would be no doubt, the Premier concluded, that when they decided on it and the pool was launched it would have the ownership of the sugar and the authority to negotiate with the refiners and carry the whole transaction through.

Effort to Renew Agreement.

Mr. Powell said he did not believe that all the means of renewing the agreement had been exhausted. He said that he thought before adopting the pool system it was their duty to go again to the Commonwealth Government and ask for a renewal.

The Premier: If I thought there was the remotest possibility of getting a renewal, I would go bald-headed for it.

Mr. Powell said he believed the Premier was honestly trying to do something from his point of view. The producers, he said, under existing conditions, could take no less than what they were receiving at present. He then moved the following motion on the understanding that the formation of a pool was to be an alternative:—
“That in view of the fact that the effect of the current sugar agreement has been to substantially assist to stabilise the industry, and having regard also to the very great importance which the industry is economically, industrially, and nationally to the Commonwealth as a whole and to the State of Queensland and New South Wales in particular, this conference strongly urges upon the Commonwealth and State Governments the urgent necessity of renewing the agreement, at the same price, for a period of five years.”

The motion was carried unanimously, and all subsequent resolutions were agreed to failing the renewal of the agreement.

Pool Favoured.

The Premier's proposal for the formation of the sugar pool was then placed before the conference, and it was adopted unanimously.

Mr. Pritchard then moved—

“That the Queensland Government be asked to acquire the whole of the Queensland output under the provisions of the Sugar Acquisition Act, and that the Colonial

Sugar Refining Company be asked to include in the pool the whole of the New South Wales output from their three mills."

This motion was agreed to unanimously.

Mr. Goldfinch (C.S.R. Representative): I do not think there will be any difficulty, because the company would be quite prepared to bring all New South Wales in.

Black Sugar Barred.

Mr. Gillies then moved—

"While the pool is in operation, the Commonwealth Government to prohibit the importation of black-grown sugar, except so much as is required from time to time to make good any Australian shortage, this embargo to be applied subject to the conditions stated in clause (4) relating to price to be charged to the consumers." The motion was adopted.

Retail Price of Sugar—4½d. per lb.

The Conference then considered the proposal which had been moved by Mr. Gillies, as follows:—

"That during the currency of the pool, refined sugar to be retailed at a price not exceeding 4½d. in the metropolitan towns."

Mr. Doherty moved as an amendment that the price should be 4½d. a lb.

Mr. Johnson seconded the amendment.

Senator Crawford did not favour the conference saying the price at which sugar could be retailed. The retail price was a matter over which they had no control; in fact, it did not very much concern them. They should say the price at which they would sell their raw sugar. He thought another alternative should be added—that of increased duties.

Mr. Johnson: Not an alternative—an addition.

Senator Crawford said he did not see how they could follow the sugar into the stores.

The Premier: How would you satisfy the Commonwealth if you do not state a price? We put in the retail price for the reason that our interests are largely concerned in what price rules. There was a difficulty in controlling the retail price, he continued, but it did not represent an insuperable difficulty. It was essential that they should be able to tell the Commonwealth what the retail price would be. At a price of £27 a ton, the pool would be left with £15 a ton to cover the whole range of costs. Those costs, some years ago, were covered by half that amount. That meant that the pool would have a fairly large sum on its hands. It was on the basis of £27 a ton for raw sugar that he had suggested a retail price of 4½d. If it were a mere question of asking for 4½d., he would not oppose the proposal, on the understanding that if the Commonwealth did not agree to it, they would have to give the matter further consideration.

Mr. Goldfinch said, with authority, that his company could not assume control of the retail price.

Mr. Pritchard pointed to the difficulty of fixing prices on the basis of a farthing. When that had been suggested previously, it was stated that the price would be 5d. He questioned whether they should stipulate a retail price, or fix a price for 1A sugar, leaving the States the right of controlling the retail price. Natural competition would prevent the retailers from overstepping the mark.

He suggested that the motion should be altered to read—

"That 1A refined sugar should be retailed at such a price as would ensure consumers securing sugar at 4½d. a lb. in capital cities."

Mr. Doherty accepted Mr. Pritchard's proposed amendment, which was agreed to.

The Conference further favoured the making of an agreement between the pool and the refiners for the refining and distribution of sugar.

Allocation of Price.

On the resumption of business on the 24th January the Conference considered a proposal by Mr. Powell.

Mr. Powell proposed that the allocation of the price to be paid for raw sugar should be left in the hands of the Sugar Cane Prices Board. He was supported by Messrs. Batchelor and Aide.

Mr. Goldfinch opposed the various boards making an award, and thought that the Central Cane Prices Board should make a recommendation to whatever authority was appointed to conduct the negotiations with the refiners as to the mode in which the allocation should be made.

The Premier said that it was not necessary for the local boards to meet and make divers awards. The Central Board had power to make a recommendation to the local boards. The boards could then consider the recommendation, and if they were so disposed could make their own awards. There would always be an appeal to the Central Board. The Central Board had previously made an award based on 12 c.c.s. sugar at £21 a ton, and had from time to time allocated the proportions of each £1 a ton over that between the millers and the growers. The Central Board had power to make either a recommendation or give a direction under section 13 of the Act.

Mr. Goldfinch: For how long would the direction hold?

The Premier: The Central Board would not have power to make a direction for the whole period of five years. It would only have its present powers.

Senator Crawford suggested that the Minister for Agriculture might get the Central Board to report as to the value to be placed on the raw sugar.

Mr. Marshall said that the board would be only too happy to do all that it could to assist the industry. Personally, he would sooner the board gave a direction rather than make a recommendation.

Mr. Powell: I hope the Government will not do anything to take away the rights of the growers under the Act.

The Premier: The Government has no intention of interfering in any way. The board has certain powers and the Minister could ask the board to exercise them.

The motion was then carried, and the Conference closed.

THE FRUIT INDUSTRY.

IMPORTANT NEW REGULATIONS.

The regulations under "*The Fruit Cases Act of 1912*" have been repealed and a new set of regulations issued in place of them.

These new regulations are called the "*Fruit and Vegetable Grading and Packing Regulations of 1922*," and were published in the "*Government Gazette*" of the 3rd February, 1923.

In these regulations—

"Foreign substance" means any earthy matter, stones, gravel, &c.;

"Inspector" means an inspector appointed under "*The Diseases in Plants Act of 1916*;"

"Matured fruit" means well grown fruit with normal sugar contents;

"Sound" means free from damage or decay and free from abnormal condition in fruit or vegetables due to the presence of or caused by the operations, development, growth, or decay of any insect or fungus.

These regulations provide for the grading, packing, and marketing of fruit and vegetables for sale, and any fruit or vegetables contained in any case intended for sale shall be packed in a case made in accordance with the specific measurements as set out in a schedule in the regulations for such fruit. The regulations provide that the proportion of foreign substances, in any case or package of any fruit or vegetables, shall not exceed 3 per cent. of the total weight of the contents of such case or package, as the case may be. Any person who packs any fruit or vegetables intended for sale or sells in a package any fruit or vegetables, except in accordance with the requirements of these regulations, shall be guilty of an offence.

Again, the regulations provide that where fruit is packed, the packer of such fruit shall obliterate from the case or package within which such fruit is packed all previous markings if any; and further, that he shall mark legibly and durably on the outside of such case or cases—

(a) The words "guaranteed by packer to contain one Imperial bushel, or one quarter Imperial bushel," as the case may be.

(b) The name of the variety of the fruit and the number of such fruit, and in the case of pineapples, the grade of the fruit according to the standards as set out in Schedule 2 of the regulations.

The above markings do not apply in the case of any fruit or vegetables forwarded for manufacturing purposes to any factory, if the container of such fruit or vegetables has legibly marked on it the words "For factory use."

For any breach of these regulations, the following penalties are prescribed:—

- (a) For a first offence a penalty not exceeding £2.
- (b) For a second or subsequent offence a penalty not less than £2 nor more than £10.

The schedules to the regulations give the dimensions of the various approved bushel, half-bushel, and quarter-bushel cases. These are practically the same dimensions that have been in existence for some considerable time past. The schedules also provide for the following grade standards:—

Smooth-leaf Pineapples.

- "Large" consist of sound, well-grown, matured specimens, giving eight to twelve fruit to the bushel case.
- "Choice" consist of sound, well-grown, matured specimens, running fourteen to twenty-one fruit of even size to the bushel case.
- "Firsts" consist of sound, well-grown, matured specimens, running twenty-two to twenty-eight fruit of even size to the bushel case.
- "Seconds" consist of sound, matured specimens, running twenty-nine to thirty-six fruit of even size per bushel case.

Rough-leaf Pineapples.

- "Choice" consist of sound, well-grown, matured specimens, running twenty-four fruit of even size per bushel case.
- "Firsts" consist of sound, well-grown, matured specimens, running twenty-five to twenty-seven of even size per bushel case.
- "Seconds" consist of sound, matured specimens, running twenty-eight to thirty-six of even size per bushel case.

Ripley Queens.

- "Choice" consist of sound, well-grown, matured specimens, running twenty-one fruit of even size per bushel case.
- "Firsts" consist of sound, well-grown, matured specimens, running twenty-four to twenty-seven fruit of even size per bushel case.
- "Seconds" consist of sound, matured specimens, running twenty-eight to thirty-six fruit of even size per bushel case.

Cavendish Bananas.

- "Choice" means sound fruit, free from blemish and properly packed, having a minimum length of 9 inches and a minimum circumference of 5 inches.
- "Firsts" shall mean sound fruit, properly packed, having a minimum length of 7 inches and a minimum circumference of 4 inches.
- "Seconds" shall mean sound fruit, properly packed, having a minimum length of 6 inches, and a minimum circumference of 3½ inches.

All measurements for length are to be taken on the outside of the curve from the junction of the fruit at the stem-end to the top of the fruit.

HOW TO KILL A FOWL.

The average person uses the axe and makes a gruesome mess of the job. The proper method, and the most humane, is to hold the two legs and the ends of the wings, passing under the body, tightly in one hand. Place one finger of the other hand across the throat and the other two (index and third fingers) across the back of the bird's head. Bend back the head sharply, and so dislocate the cervical vertebrae of the neck, and then give the head a forward pull. The latter act separates the dislocated parts, and provides a small sac, into which the blood flows. Then, with a sharp-pointed knife, perforate the sac and the blood will flow. No time must be lost, as poultry blood coagulates quickly. Dry-picking is seldom done at home. The scalding method is the quickest, even if there is a waste of feathers. The water should be just off the boil, and the bird should be immersed so as to wet all the plumage to the skin. With young, tender birds, if the water is too hot, much skin comes away with the feathers, and an unsightly result is obtained.—
"Poultry."

VITICULTURE IN THE NORTH.

By W. J. ROSS, Instructor in Fruit Culture.

In the Charters Towers District much confusion as to vine nomenclature has hitherto existed, and in the course of an official visit to that area in December last, when vines were in full foliage and crop, Mr. Ross was of some assistance to the growers in determining and applying the correct names to the principal varieties cultivated in that part of the State.—Ed.

After careful study in the vineyards of the habits and character of several varieties freely grown in the Charters Towers district, and which have been known hitherto to local vignerons by largely incorrect names, success in regard to identification and naming was attained in quite a number of instances. As an example of what confusion in regard to naming means, it might be mentioned that a very excellent grape now making itself noticeable in local vineyards has, to some extent, been deprived of its full measure of credit through being identified wrongly with other comparatively inferior kinds, which have consequently enjoyed a false reputation. The variety referred to is Madresfield Court; a first-class berry, with an excellent muscat flavour and good packing qualities, and which does well in the Charters Towers area. Again, the wrong naming of varieties is likely to result in the inexperienced vigneron, or beginner in the industry, obtaining data concerning the suitability or otherwise, of varieties grown under local conditions, of a very misleading character, and it is important that such errors be corrected whenever opportunity is afforded. Included among the varieties either named wrongly or not identified by many growers are Cinsaut, Black Prince, Snow's Muscat or Muscat Hamburg, Lady Downe's Seedling, Madresfield Court, and one or two others. The most common variety at present in the district is the Royal Ascot, which is very prolific. The only drawback affecting this variety, seemingly, is its tendency to crack, should an excess of moisture resulting from frequent thunderstorms about the harvesting period be experienced. However, by the exercise of judgment in cutting, and care in handling and packing, it will carry to considerably distant markets. As much as 6 tons to the acre of this berry have been produced in the Towers area, and this year there are several crops estimated to yield over 4 tons to the acre. Nevertheless, I am of the opinion that the superiority of other less known kinds at present will displace this variety in many vineyards. Madresfield Court, for instance, bids fair to establish a reputation for Towers-grown grapes throughout the North, as up to the present its characteristics, so far as growth, bearing, and quality are concerned, has been very satisfactory. It was noted to be doing well in a number of vineyards, and the fruit being of an attractive appearance with a somewhat tough skin, constituting good packing qualities, makes it worthy of extensive planting. Another choice variety named Gordo Blanco, considered by vignerons to be one of the best, if not the best, white grape in cultivation, promises to succeed well in the Charters Towers district. Many young vines of this variety were observed making strong growth and carrying fair crops of well-set bunches with large berries in Mr. Mann's garden. Snow's Muscat, another first quality black grape, is also doing well and is entitled to a prominent position in local vineyards. Other valuable additions are:—Alicante, Cornichon, Red Frontignac, Henab Turki, and Black Prince, while from the American varieties for local market Wilder and Goethe may be selected as likely to do best.

As regards flavour and appearance Charters Towers grapes can hold their own with those from the best vineyards, and they are altogether superior to those imported from the South last season. It rests with growers themselves to show that it is not necessary to import this fruit for northern requirements at all. It must be remembered, however, that this will necessitate the exercise of good judgment in respect to the right stage of ripeness for harvesting and the avoidance of cutting bunches when too green, as was done this season by some growers. Placing immature or unripe grapes on the market is damaging to the whole industry, and the practice is therefore condemned. Care in handling and packing is essential, and as much of the bloom as is possible should be allowed to remain on the bunches, thereby improving their appearance when placed in the shop windows.

Grapes, too, must be handled with care during transit from the garden to rail or wharf, and if this is done the district can capture and maintain the whole of the northern trade from Bowen to Cooktown. It is worthy of mention that trial shipments to Cairns this season proved the foregoing contention; while wrapping each bunch in paper separately before packing demonstrated conclusively that this was the safest means of ensuring the landing of shipments in good condition.

Touching on the pruning and training of vines, I noted that there is yet much knowledge to be acquired by many growers, and it is proposed to visit the district again in season with the object of giving instruction in this branch. A tendency on the part of some growers to practice irrigation excessively was also observed, and it is proposed to make this matter the subject of a future paper.

THE MAIN ROADS BOARD.

A Year of Achievement.

On 8th March, 1920, the Main Roads Act, introduced by the Government and passed by the Queensland Parliament, received the Royal Assent. In October of the same year the Chairman, Mr. J. R. Kemp, was appointed. Early in 1921 other members of the Board—Messrs. J. A. Fraser and D. A. Crawford—were appointed. The first meeting was held on the 1st February of that year. The mapping out of an administrative system, the collection of data, and a general survey of rural road requirements had already been made, and the Board proceeded to carry out its plans. To-day the Main Roads Board is a forceful factor in the Queensland Government's general scheme for enriching rural life; its initials, "M.R.B.," are becoming one of the State's best known sign posts, and is already accepted as a symbol of and a synonym for sound and enduring highway construction.

Prior to the institution of the Main Roads Board very little had been done in Queensland by Local Authorities on permanent road construction. The fact that only a very small percentage of shires were able to furnish copies of specifications or drawings of standard road profiles when required by the Board indicated that local road construction hitherto had not been governed by any set plan. Taking a given year, 1918-1919, though the general rate revenue of Queensland shires approximated £450,000, very little sound road construction was done in most of the districts covered by a wide inspectional itinerary.

In the first annual report of the Board, covering the activities of the year ended 30th June, 1922, and which is just to hand, there is much valuable material, and it is worth the study of all interested in vigorous development of the State. The march of the motor vehicle compels greater attention to facilitation of inland transport and all that it means to rural dwellers who have hitherto lived beyond the range of the petrol patrol.

The following notes on the roads of Queensland and plans for their improvement, together with the accompanying illustrations, are taken from the Board's report:—

Condition of Queensland Roads.

With the exception of one or two roads constructed some twenty years ago and roads constructed under Acts of the early sixties, very little attempt has been made to construct roads on a systematic plan, and even where such roads have been constructed, the efforts of the Local Authority to maintain them have, in many instances, been ill-directed. Examples of these old roads exist in the old Gympie and Maryborough road and in the Brisbane-Warwick road.

These roads have rough pitched Telford or corduroy foundations—that is, a foundation of spalls wedged together or of timber logs which originally was capped with broken metal but is now worn away—with the result that traffic will not use the rough foundation. Where the surface has been replaced the metal has been crowned up so high that vehicles side-skid badly. Local Authorities have, in many instances, completely neglected to maintain *through roads*; bridges have been allowed to tumble down and have not been replaced. The reason for this neglect is obviously, in most cases, that no rate revenue is derivable from the adjoining lands, and the Councils have not felt it their duty to maintain roads for traffic whose origin is outside their area, but other cases exist where the road has been superseded by a railway. When such roads become "Main" this state of things will be remedied. The maintenance and reconstruction costs to be borne by the Local Authorities amount to one-half the total, and the Board has power to apportion part of such costs to the Local Authorities benefiting, even though the road is outside their area.



PLATE 31.—BLACKSOIL ROAD ON THE DARLING DOWNS CUT UP BY WHEEL TRAFFIC DURING WET WEATHER.



PLATE 32.—BLACKSOIL ROAD ON THE DARLING DOWNS IN A BAD STATE THROUGH NEGLECT OF MAINTENANCE.

Many Local Authorities do not appear to recognise that road making is a specialist's job. Instances may be quoted of long and expensive cuttings having been excavated in an attempt to improve the road. The result has been merely to obtain the same grade as before without any compensating advantage. The employment of a qualified engineer in such a case would have resulted in vast improvement to the grade at a much lessened cost and without restricting traffic to a narrow drain cutting.

No real attempt in the past has been made to locate roads on scientific principles, the result being that numerous deviations are now necessary.

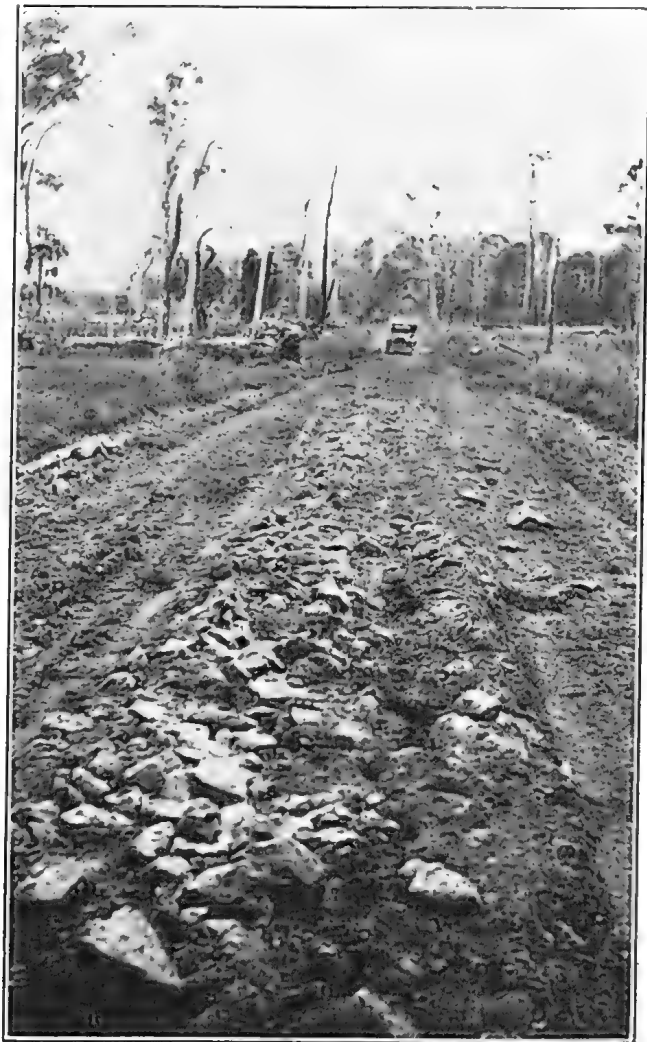


PLATE 33.—SHOWING ONE METHOD OF ROAD CONSTRUCTION
AS PRACTISED IN SOME SHIRES.

The pioneer surveyors must not, however, be too severely criticised on that account, as funds were seldom available for constructing the road on its proper location. The primary consideration of the surveyor was to locate an accessible road which would have a level cross section (irrespective of longitudinal grade) thus, for the time being, obviating any expenditure other than that for grubbing and clearing.

Reciprocity between the Survey Branch of the Lands Department and this Board has now been established which it is hoped will in the future render the re-location of Main Roads unnecessary in country to be opened for settlement. Satisfactory re-location within the boundaries of a surveyed road may be possible at times.

Numerous cases exist in each of the divisions of the State where roads have been laid out on grades of 1 in 10 or thereabout, with pinches as steep as 1 in 6. At a later date attempts have been made to eliminate the steeper portions. The final result has been the spending of large sums of money on roads having grades of 1 in 10. Such grades are the cause of continued heavy maintenance charges, and most severely limit the loads. Metalling quickly disappears on them owing to the heavy tearing action of wheels and horses' hoofs, combined with the rush of water during heavy rains.

The expenditure of not much greater sums of money, in many notable instances, would have resulted in properly located roads with maximum grades of 1 in 20. The Toll Bar road which rises from the lowlands to Toowoomba is an example. Grades not exceeding 1 in 20 could have been obtained in lieu of the present range road (which is steep and expensive to maintain) without increasing the total distance between Toowoomba and Helidon. This would have had the great advantage of also eliminating a section of road along the sticky black soil flats and would have given equally good access.

The effect of steepness of grade upon the life of a macadam or other road is very marked. Roads constructed in Southern Queensland some few years ago on



PLATE 34.—SHOWING DAMAGE TO ROAD BY BAD FOUNDATION AND EXCESSIVE LOADS.

grades of 1 in 10 or 1 in 12 in substantial fashion with broken metal are at the present time in a deplorable condition, whilst other portions not so well constructed but on easy grades are in fairly good order.

The increase in the cost of haulage by animal traction with increases of grade is approximately as follow:—

If costs on a grade 1 in 60 are 1s. per ton mile, then on grade 1 in 20 they will be 2s. per ton mile, and on grade 1 in 10 they will be 5s. 6d. per ton mile.

It is highly undesirable to construct new main roads on gradients steeper than 1 in 20, unless very special circumstances exist.

The saving in time of travel due to improved roads has the same effect as bringing the producer nearer the market and the traveller nearer his objective.

A recognised principle in land valuation is that, other things being equal, the values decrease as the distance from railway or markets increase. Assuming for the moment that a property 10 miles from a market is worth less than a similar one adjacent thereto by an amount of £3 per acre, it is certain that a reduction in the time of travel by one-half would have the same effect as bringing the market within 5 miles of the farm and raising its value by 30s. per acre.

Some such reduction in the time of travel undoubtedly follows proper road construction.

The black soils of the Darling Downs present conditions after rain which could hardly be worse. The soil when wet has an exceedingly low bearing strength and is particularly sticky. Most of the roads are almost impassable after rain, but occasionally a sound piece of road which has originally been solidly constructed is met. Failure of the previously constructed roads has been due to—

- (a) Improper selection of material.
- (b) Insufficient thickness of good stone.
- (c) Non-regulation of loads.

The existing roads leading to Tambourine, Beechmount, Maleny, Montville, and other rich fruitgrowing or dairying districts are all badly constructed on steep grades, whilst in North Queensland the great dairying and timber areas are almost roadless.

The settlers of these districts undoubtedly suffer hardship and loss by reason of the lack of decent roads, and the Board has therefore devoted special attention to the early alleviation of present conditions.

Proposed Improvements.

The hopelessness of ever constructing and maintaining roads in the hilly and mountainous areas within the existing road boundaries on account of the excessively steep grades was most apparent to the Board, and a similar fact was also noted by the Victorian Roads Board in its first annual report on Gippsland roads.

In many instances the only construction on Main Roads which at the present day will be warranted is the improvement of creek and river crossings, as in much of the Western Downs and Plains, or clearing and light gravelled formation, as on the Coastal Plains; but, in others, nothing short of solid construction (as on black soil of the Downs) or of side cutting and metalling in wet mountainous country will suffice.

The funds at the Board's disposal will be expended upon works of an enduring nature, and first and foremost under this heading comes *drainage*. Correct location and proper surfacing is next in importance, for though the surface of a road may wear out, the value of the grade remains.

The subject of drainage is of immense importance, especially in the Coastal and hinterland regions of Queensland, where the annual rainfall varies from 60 to 200 inches per annum, and where over 30 inches in twenty-four hours have been recorded.

It does not follow that with the funds available the best results would be obtained by building a small mileage of wide surfaced roads, but rather that the best economic results to the community would follow the building of greater lengths to a narrower standard; but all loan money should be spent on enduring features.

The effect of improvement of surface in reducing tractive effort (and consequent cost of haulage) is illustrated in the following table (Bulletin 463, Department of Agriculture, U.S.A.):—

Gradient Level.	Load which a 1,200 lb. horse can haul continuously.
Deep sand	760 lb.
Dry earth	1,600 lb.
Firm earth or sand clay	2,285 lb.
Gravel (average)	3,000 lb.
Macadam (first class)	4,365 lb.

The lesser intensity of pressure upon a foundation the greater the strength and lasting qualities of the road. An increase in the thickness of crust from 7 inches to 10 inches results in an increase in the strength of the road by 100 per cent. for an increase of surfacing cost of 42 per cent., which goes to show that it is bad policy to skimp the crust thickness of roads.

Type of Road Surfaces.

The type of surface paving to be adopted depends upon—

- (a) The class and volume of traffic, and cost of the various materials available.
- (b) The maintenance costs per mile for each class of material available.

The sweeping statement is often made that this or that class of paving material is the only one which should be used, but the absurdity of using, say, concrete as a paving material on a road carrying a small tonnage per annum in place of a cheaper gravel or macadam is self-evident.



PLATE 35.—DAMAGE CAUSED BY WHEEL TRAFFIC OWING TO INSUFFICIENT THICKNESS OF MATERIAL.



PLATE 36.—COASTAL RANGE—ROAD ON A GRADE, 1 IN 3, MUCH GUTTED BY RAIN.

The problem of selection of type of paving material resolves itself into whether the cost of maintenance of the cheaper pavement, plus interest and redemption on the capital cost (based on its lesser life), will exceed the annual interest and redemption on capital cost plus maintenance charges on longer-lived more expensive pavement.

The use of local material should always be first considered.

Road Materials.

The points to be observed in the selection of road metal are—

- (1) Hardness.
- (2) Toughness.
- (3) Cementing value.

In the absence of any practical knowledge of the value of a stone for road-making purposes, microscopic examination will reveal its structure, mineral composition and state of decay, and attrition and crushing tests will determine its possibilities for wear. These tests as occasion demands are being carried out at the Queensland University.

The use of a strong binder with good cementing qualities is as essential as the use of good stone. The use of vegetable debris or clay as a binder results in the early destruction of the surface by ravelling during dry weather, and by formation of mud in wet weather.

For this reason screening plant should always be employed in conjunction with crushers so as to obtain suitable binder.

Quarries are being developed by the Board at the present time on the Atherton Tableland, Darling Downs, Lowood, and Rockhampton Districts.

Maintenance of any type of surface should be extensive enough to at all times keep the foundation or bottom course protected from wear.

For similar volumes of traffic, steepness of grades, efficiency of drainage, and weather conditions, the maintenance of loam surfaces will in general be more costly than gravel, gravel than broken stone, and broken stone more costly than tar macadam or concrete, but the selection of pavement type must be left to the designer, who should consider the factors mentioned in every case.

The tarring of macadam surfaces costs from 2d. to 8d. per square yard, and is an economical form of surfacing where the traffic is dense.

Mountain Roads.

Mountain roads require a great deal of care in fixing the centre line. Unless the question be thoroughly investigated a great volume of earth work may be unnecessarily excavated, hence in very steep broken country contour plans along the trial grade are being prepared in most cases so that the correct position of the centre line (taking into consideration road widths, horizontal curvature limits, &c.) may be determined. The extra survey and drawing office costs are offsetted many times over by the saving in earth work.

Bridges, Culverts, Inverts.

The construction and maintenance of bridges, culverts, and inverts come within the ambit of the Board's functions, and here again the type to be adopted is being considered strictly upon the requirements.

There is a tendency at the present day to almost exclusively utilise reinforced concrete in the construction of highway bridges, but the problem of type resolves itself into—

“What sum of money invested now would build and maintain a reinforced concrete structure having an indefinite life?”

“What sum of money invested now would provide for the erection and maintenance of timber or steel structures having a limited life, and renew such structure at similar limited intervals, in perpetuity, taking into account possible increments of cost and inconvenience to the travelling public during re-erection?”

“Whether a bridge should be high or low level, beam, or truss, depends upon the local conditions.”

The widths adopted will be either 12, 16, or 18 clear feet, depending upon the volume and class of traffic and length of bridge.



PLATE 37.—METALLING ALL REMOVED BY HEAVY RAINS ON STEEP GRADE.



PLATE 38.—BRIDGE IN A BAD STATE THROUGH NEGLECT OF MAINTENANCE.

The high torrential rainfall, in some cases amounting to 33 inches in twenty-four hours in the coastal districts of Queensland, renders the construction of low level bridges a necessity, for often the cost of a high level bridge would be prohibitive. Care in the location of the approaches to low level bridges is very necessary. Most of those in existence have unnecessarily steep gradients.

Road Widths.

As before explained, these will to a large extent, especially in side cutting in steep to moderately steep country, be governed by the amount of money available or likely to be available for construction. This is a function of the likely traffic.

In general, surfaced roads may be divided into two types—single and double tracks. Refuges at frequent intervals are required on single track roads, so that vehicles may pass each other in safety.

Carts vary in width from 5 feet to 6 feet.

Cars vary in width from 6 feet 6 inches to 6 feet 8 inches.

Carts frequently have frames for loading hay, &c., upon them. The minimum width of metalled or gravelled surface for single tracks should be not less than *9 feet* and for double tracks *15 feet*.

The provision of a metalled or gravelled surface requires an extra width for shouldering with selected material and for water tables, otherwise the metal would push outwards, and the road would quickly lose its shape and value.

The designer should always look to the future, and although a road may not be metalled as soon as constructed, it generally will be within a reasonable period. Hence it is desirable that the earthwork should not be narrower on single track roads than *17 feet*, except in special cases, and on double tracks than *23 feet*. Pioneer roads may be as narrow as 12 feet overall.

The clearing and grubbing forms a substantial part of the cost of the work in scrub country. Very little benefit will ever be incurred in increasing the width of hardened surface of a single track road beyond 12 feet or 20 feet overall (in side cutting).

This maximum width is desirable when funds permit, as it gives a wider surface to travel over with less risk of wheel tracking, and also minimises the risk of the wheels getting close to the edge and damaging the metal.

In cases where funds do not permit of 12 feet of hardened surface, 9 feet may be adopted, flanks being of selected material and the total width of side cutting reduced to 17 feet where the road is in earth and 15 feet where rock occurs on the inside watertable.

The great tendency on surfaced roads is for teamsters to get one wheel off the metal when descending a grade in order to brake the vehicle, and this has an especially destructive effect on the narrower roads. For this reason it is desirable to ease the grades so that this will not be necessary. Great saving in the maintenance of metalled roads is the result.

Where the gradients are very easy (from 1 in 30 and easier) and the traffic light, there should not be so much objection to the narrower type of single track metalled road.

Where refuges are provided on a single track metalled road, they should be metalled and the curved approaches to them similarly treated, so that the edges of the metal will not be damaged by vehicles pulling off. The metalling should always be widened out, and should extend to the watertable on the inside of sharp curves for the same reason. By carefully considering these facts, great economy in construction and maintenance may be effected.

Where the earthworks are light, as in flat or slightly undulating country, the saving in first cost by the narrowing of the formation is not so great, and in general the width *should* be not less than indicated on the diagram accompanying the Board's specification.

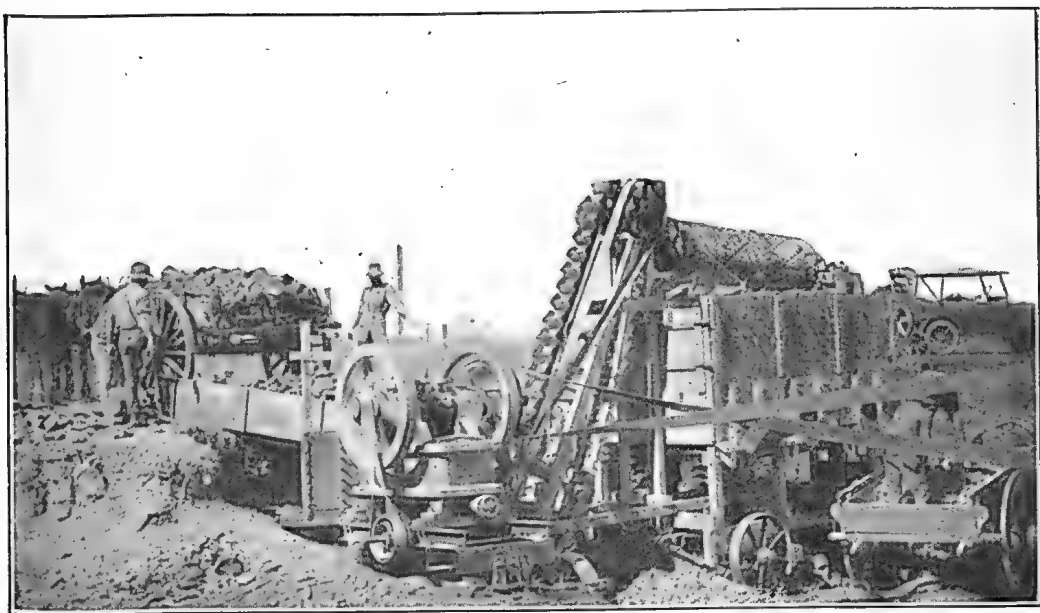


PLATE 39.—PORTABLE METAL-CRUSHING PLANT, DARLING DOWNS.



PLATE 40.—SHOWING INTERMEDIATE COURSE OF METAL AND FLANKS BEING ROLLED WITH A 5-TON WATER-BALLASTED ROLLER.

The standards contained therein have been designed to meet each particular case, and the selection of the correct type in each instance must be left to the judgment of the designer.

Pioneer roads or intercommunication routes passing long distances through poor country should be reduced in overall width to about 12 feet on side cutting.

Road Drainage.—This is of the greatest importance, and special note of this matter is made in the general instructions to engineers, and in the Standard Specification.

The first essential of metalled or gravelled roads is that the foundation be kept dry. This is accomplished—

- (a) By proper catch drains, water tabling, and diversion of water therefrom at frequent suitable points.
- (b) By open spall mitre drains under the road bed.
- (c) By filling the voids of the top course with strong binder and rolling to a smooth, nearly waterproof, compact surface.

Proper care must be taken to ensure that material which may become waterlogged, such as clay, is not used within at least 6 inches of the underside of the metal or gravel.

Horizontal Curvature Limits.

The limits of curvature on any particular road is bound up with the capital cost for, in the case of mountain roads intersected by gullies and with projecting spurs, the cost rapidly increases with increase of the radii of curves owing to the heavier cuts and fills involved.

The Board has adopted as the irreducible minimum radii of 80 feet around gullies and 100 feet around spurs, for otherwise the risks of accident would be too great and the utility of the road seriously impaired, and has provided that the gradients around curves must be so eased as to make tractive resistance at least not greater than on straights. The case is not quite similar to grade compensation in railroad construction, as upon the length and radius of a road curve depend—

- (a) Line of sight, and
- (b) The percentage of animals in the team which are thrown out of effective action.

This grade compensation also provides for future easing of curves, which results in shortening the length and steepening the grade. The grade compensation provided for in the original plan will thus allow of the ruling vertical gradient not being exceeded if future improvements are undertaken. In flat or easy country the radius of curvature should be as great as possible, without incurring heavy expense in land resumption.

It is often argued that the limitation of curvature on mountain roads is unwarranted, and the case of the short radii adopted in cities is quoted. It must, however, be remembered that resumption costs for cutting off all corners in cities would often be prohibitive, and secondly, that the line of sight is very much greater than would be the case with a similar radius around a spur on a mountain road, consequently the cases are not parallel.

On roads where there will be a fair proportion of fast to moderately fast traffic a line of sight of 200 feet is desirable, but this is seldom attainable in mountain roads.

In general, the steeper the grade the greater the necessity for care in this direction, as speed control is more difficult on the steeper grades.



PLATE 41.—MAINTENANCE—RESURFACING RECENTLY DONE ON A MAIN ROAD.



PLATE 42.—SHOWING OLD ROAD AND NEW ROAD BELOW—NOW UNDER CONSTRUCTION.

AGRICULTURAL EDUCATION.

Queensland and California Compared.

"California is one of the few American States whose general conditions resemble those of Queensland; and it is regarded as one of the most progressive States in the Union.

"I have long realised the great necessity in Queensland for a strong and well-organised system of vocational and rural schools, and the desirability of the University playing a much more leading part than it does in the solving of our agricultural problems and the development of our primary resources.

"American vocational schools which specialise on the agricultural side are now conducted on much the same lines as Queensland's rural schools. The system of extensive field work and farm operations at these schools has been discontinued, but the science work has been much strengthened.

"Queensland rural schools largely confine outside work to observation, and American experience proves that this policy is a sound one."

MR. J. D. STORY.

Late in January, Mr. J. D. Story, Public Service Commissioner and Chairman of the Administrative Committee of the Council of Agriculture, returned from California, whither he had gone to investigate on behalf of the Queensland Government, the various aspects of agriculture.

"I had long desired," said Mr. Story, in the course of a Press interview, "to visit California to see the educational and other kindred institutions of that State. California is one of the few American States whose general conditions resemble those of Queensland; and it is regarded as one of the most progressive States of the Union."

Mr. Story added that while being familiar with the leading Australian institutions, he had been particularly anxious to get into closer touch with some of America's vocational schools, and the organisation and ramifications of a typical Union University, which had attached to it a well developed College of Agriculture.

"As to primary and secondary education, I am convinced that Australia holds her own quite well in the essential subjects. In fact, several educators with whom I discussed matters expressed the opinion that Australian students who have gone to California to take special courses in local universities more than held their own in English and mathematics. In Queensland we do not indulge to the same extent in 'extra' subjects that the Americans do, but I think that Queensland would be well advised to continue to adhere to the essentials.

"I have long realised," he went on, "the great necessity in Queensland for a strong and well organised system of vocational and rural schools, and the desirability of the University playing a much more leading part than it does in the solving of our agricultural problems and the development of our primary resources. That the University has not done so to any great extent is not the fault of the University; funds had been lacking. We cannot be unmindful that the maintaining of technical departments and officials, in common with other departments and officials, falls upon the State, and that upon the State also devolves the main burden of the financing of the University. These facts give rise to the feeling that as the University and the State technical departments continue to develop, overlapping and unnecessary expenditure might ensue, unless adequate precautions are taken. The need that this possible overlapping and unnecessary expenditure should be avoided, consistently with the efficient discharge by each section of its proper functions, has come home to me with greater force since I have assumed the duties of Public Service Commissioner.

"These thoughts in turn suggest that in their development technical departments should not forget that the University exists," he went on; "that the University in turn should not forget that the technical departments exist; but that each section should realise that a close and friendly relationship, with clear ideas as to the functions of each section, should be established and maintained."

American vocational schools which specialise on the agricultural side were now conducted on much the same lines as Queensland's rural schools. The system of extensive field work and farm operations at these schools had been discontinued, but the science work had been much strengthened. Queensland rural schools largely confined outside work to observation work, and American experience proved that this policy was a sound one. In California, the home project system had been found to be very effective. Under this system, the lad conducted certain approved work at his home under expert supervision in one of such subjects as the raising of pigs, poultry, the growing of vegetables, potatoes, maize. The work done was spoken of very favourably by the officers of the Department of Agriculture, by the County Farm Advisers, and by many members of the College of Agriculture. The system was said to have many good points; it was economical, inasmuch as it obviated the finding out of public funds of large sums for the acquiring of agricultural sites; for the erection of special buildings; for the providing of equipment; for the cost of upkeep, and other charges. Further, it overcame the difficulty of having to make special arrangements for the field work, care of plant and animals, during the school vacations. It was held also that the system made the lad interested in a project at his own farm home, and tended to make the home interested in the special work of the lad. Certainly the system had much to commend it.

So far as they had gone in their systematic efforts for the training of apprentices, the American Federal and State authorities, after being given an outline of the schemes, had had to admit that Queensland was ahead of them.

Delving for fundamentals, Mr. Story found that in regard to the agricultural industry of the United States, four authorities were concerned:—

1. The Federal Department of Agriculture, which dealt with research and investigation, and the enforcement of Federal laws concerning quarantine, pest control and standardisation.

2. The State Department of Agriculture which was regarded as the State's "watchdog" of agriculture, and whose main functions were the enforcing of the State laws and regulations relating to the industry.

3. The county, which appointed and paid the horticultural commissioners, who dealt particularly with the plant industry of the country.

4. The University College of Agriculture, whose functions were three-fold—namely, research and investigation; resident instruction, and non-resident instruction, popularly known as "agricultural extension." The "extension" work was conducted through representatives of the college known as county farm advisers. The main work of these advisers was educational, and consisted in making available to the farmers information gathered and discovered by the Federal Department of Agriculture through its various bureaux and divisions, and by the College of Agriculture through its experiment stations, research laboratories, and other accessories.

It was somewhat surprising to find that the functions of the University College of Agriculture were so far-reaching; the work embraced the full-degree course in agriculture, farm diploma courses, and periodic weekly and fortnightly courses in special subjects for farmers. As was generally known, California had adopted a high grade of "standardisation." The effective carrying out of this system increased the percentage of "culls." The question then arose as to how to make some commercial use of the culls. The fruit products laboratory was established for the purpose, and it seemed to be doing good work. In Queensland they were now adopting a system of standardisation, and they would be faced with the same difficulties regarding culls. Would their University be enabled to help the primary producers to make some commercial use of their culls, and of present waste products? Therein lay a fine opportunity for good work.

Succeeding issues will contain more detailed accounts of the results of Mr. Story's studies and investigations of Californian conditions, in relation particularly to the organising, administrative, and instructional activities of the agricultural industry.

COTTON CULTURE.

Mr. W. G. Wells (Government cotton specialist), after a prolonged study tour of the Queensland cotton areas, is of opinion that the cotton-growers of this State are not realising the necessity for the proper cultivation of the seed beds and the cultivation of the crops generally. The latter he has found to be true in practically every district he has visited.

Best Methods—Advice to Growers.

In the course of an account of his cotton crop studies to the Press, Mr. Wells said that farm after farm was visited, and in nearly every case where the pigweed and summer grass had been allowed to grow, the cotton plants were suffering from lack of moisture. The growers with such crops complained of the droughty conditions, but did not seem to be inclined to blame their poor methods of cultivation as being contributory causes to the dry condition of the plants. In nearly every district farmers were to be found who had thoroughly cultivated their crops from the time the plants had sprouted through the earth, and, while it was true that several of such crops were commencing to show signs of the effects of the drought, there was no comparison as a rule with such crops and the crops in the adjoining fields where the weeds had been allowed to grow.

Good Cultivation Wins.

The well-cultivated crops were laden with large, well-developed bolls, and only needed good rains to continue the development of the bolls which were already on the plant, the formation of new flower buds (squares), and new growth of the main stalk and fruiting branches. Many of the growers seemed to have overlooked the fact where the well-laden and cultivated plants were showing signs of suffering from lack of moisture that the crop of bolls and squares was absorbing the available moisture. It was not a case, at all, where the advised methods of cultivation had failed, and the plants were in the same condition as uncultivated fields, because in one case the crop of bolls was taking the moisture, while in the other case it was the weeds. Several crops were inspected which had been cleaned up and well cultivated within the previous week, and the plants were not freshening up and developing as the grower had expected. The fact had been overlooked that the pigweed and grass had been utilising a tremendous amount of the available moisture during the development of their growth, and, while their destruction had left the remaining moisture for the cotton plants, the damage had been done, and a good rain was needed to replenish the supply which the weeds had taken. A few fields were found where even under weedy conditions the plants were developing a fine crop of bolls and squares, and gave promise of producing very fine yields. This was due to the crop having had recent rains, or to the soil being particularly resistant to drought. The growers did not seem to realise that they were not taking advantage of fortunate circumstances to produce a maximum yield under such droughty conditions, but were satisfied that their crops were above the average for their district, and were not suffering from the drought.

Best Methods Necessary.

It should be remembered that under such droughty conditions as had prevailed this year in several of the districts that the very best methods of cultivation were necessary to insure the proper development of the plants, and more particularly the seed cotton in the bolls. The fact that a plant had several large bolls and seemed to be resisting the drought somewhat was no indication that the fibres within the bolls were developing properly.

Unless there was the proper amount of moisture being secured the fibres in all probability would be weak and irregular in length—characters which were very undesirable, and which lessened the value of cotton to a marked degree.

It was only by conserving all available moisture in the soil for the use of the cotton plants that these defects could be hoped to be overcome in seasons when droughty conditions prevailed, and the grower who persisted in following the poor methods of cultivation, which seemed to be in vogue at present, was certainly not going to secure profitable returns, and was doing the cotton industry of Queensland a very serious injury, and one which might severely restrict the industry from developing into the proportions which the natural facilities at present seemed to indicate possible.

Careless Cultivation is Expensive.

It was only by continuous cultivation and chipping of the weeds in the drill that the crop could be kept under control. When the periods of continuous rains set in, such crops were in a condition to go until the rains ceased without any serious damage being done, whereas fields which had not been kept clean before the rains set in presented a serious problem when it was possible to cultivate after the rains were over. The expense was also greater in destroying the older weeds, as much of it would have to be done by hand before a "scarifier" could be used between the rows to work up a good mulch, whereas a crop with young weeds could be quickly cultivated and more of the moisture retained. It was not appreciated, nor did it seem to be understood by the average farmer, that the soil should be cultivated after every rain of enough severity to destroy a good dust mulch. As soon as the rain sealed the mulch, and the surface crust was formed, the sun was apt to draw the moisture from the soil at a remarkable rate, and it was only by establishing a good mulch again at the earliest possible moment that this loss of moisture could be lessened. It could thus be seen that when the cultivation was delayed for a week or more after it was possible to work the soil that an immense damage had been done to the plants—especially in districts where the rains were uncertain and every point of moisture should be conserved.

SHOW DATES FOR 1923.

Stanthorpe: 7th to 9th February.
 Warwick: 13th, 14th, and 15th February.
 Allora: 20th and 21st February.
 Clifton: 28th February and 1st March.
 Goombungee: 22nd March.
 Herberton: 2nd and 3rd April.
 Pittsworth: 4th April.
 Chinchilla: 10th and 11th April.
 Goondiwindi: 10th and 11th April.
 Killarney: 11th and 12th April.
 Esk: 11th and 12th April.
 Toowoomba: 17th and 19th April.
 Taroom: 23rd and 25th April.
 Kingaroy: 26th and 27th April.
 Maleny: 26th and 27th April.
 Miriam Vale: 26th and 27th April.
 Dalby: 2nd and 3rd May.
 Toogoolawah: 3rd and 4th May.
 Nanango: 3rd and 4th May.
 Boonah: 9th and 10th May.
 Blackall: 9th and 10th May.
 Wondai: 10th and 11th May.
 Roma: 15th and 16th May.
 Emerald: 16th and 17th April.
 Murgon: 17th and 18th May.
 Wallumbilla: 22nd and 23rd May.
 Ipswich: 23rd and 24th May.
 Kilkivan: 23rd and 24th May.
 Springsure: 23rd and 24th May.
 Beaudesert: 29th and 30th May.

Marburg: 2nd to 4th June.
 Mackay: 4th and 7th June.
 Woombye: 20th and 21st June.
 Lowood: 22nd and 23rd June.
 Rockhampton: 21st to 23rd June.
 Kilcoy: 28th and 29th June.
 Ithaca: 29th and 30th June.
 Woodford: 11th and 12th July.
 Wellington Point: 14th July.
 Caboolture: 19th and 20th July.
 Mount Gravatt: 21st July.
 Barcaldine: 24th and 25th July.
 Rosewood: 25th and 26th July.
 Pine Rivers: 27th and 28th July.
 Crow's Nest: 31st July and 1st August.
 Sandgate: 3rd and 4th August.
 Brisbane Royal National: 6th to 11th August.
 Belmont: 18th August.
 Wynnum: 31st August and 1st September.
 Zillmere: 8th September
 Laidley: 13th and 14th September.
 Beenleigh: 20th and 21st September.
 Rocklea: 22nd September.
 Toombul: 28th and 29th September.
 Kenilworth: 4th October.
 Ascot: 24th October.
 Pomona: 21st and 22nd November.
 Millaa Millaa: 23rd and 24th November.

EFFECTIVE PIG FENCE.

A request from a settler for a pig-proof fence leads to the reproduction of the stub fence illustrated herewith. Stub fences, however, are used in timber country, not only for pigs, but for sheep-yards and bull-yards. The stub fence is regarded as the only one which will keep pigs confined with certainty. Stout wire is all right for a certain time, but big sows will eventually worry their way through. The stubs are usually cut from old rails, the height for a pig fence being about 3 feet 6 inches. The posts are put in about 12 feet apart, and a trench dug between them about 6 inches wide and 6 inches to 9 inches deep. No. 8 fencing wire is used at the top and bottom of the stubs at a distance of 9 inches from the top and 9 inches from the ground. Two wires are used at both top and bottom, the wires running through separate holes about 2 inches apart. These wires are fastened to a post at one end and to a heavy stone or logs (fig. 1) at the other end, so that they will always

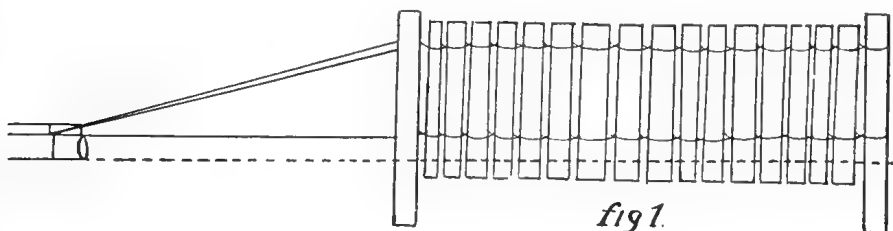


fig 1.

be tight. The stubs are put in the trench, and the wire is twisted with a bar. This is done for every stub, forming a separate loop round each one, and so keeping them tight in position. Stub fences cost more than wire fences, but last longer. One drawback to their use is that they harbour insects. For the two lower wires barbed wire is sometimes used, and is found very effective. Another good style of stub fence is used in timber country for larger stock than pigs. The stubs or saplings are let into the ground about 18 inches in a trench, and rammed tightly while upright. Two wires are then run from the starting post, A (fig. 2), to a

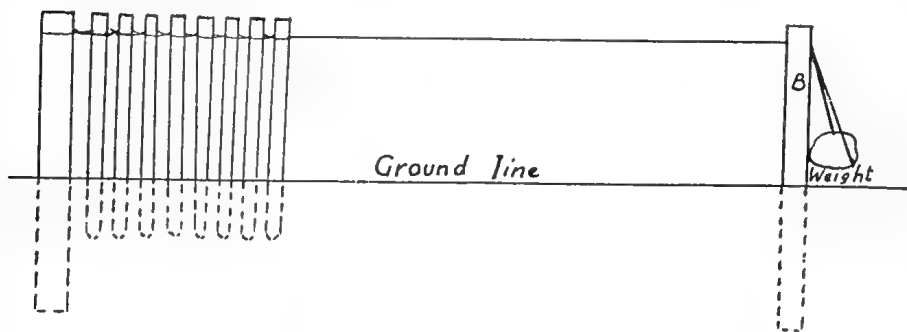


fig 2.

temporary post B, in the alignment. The wires are weighted at the temporary post to keep them taut. As each stub is put between the wires they are twisted tightly three or four times, but in opposite directions, between each stub. The stubs are afterwards sawn off level along the top, on which, if the fence is to hold large cattle, a batten is fastened to prevent stock being spiked if jumping over. The wires are eventually strained as tightly as possible to the end post when finishing off the line.—“Australasian.”

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JANUARY, 1923.

Owing to the extreme heat, the competition birds experienced a very trying time during the latter part of the month. Owing to the number of birds in moult, there was a falling off in the laying during the month. The laying of the group pens was satisfactory, considering the number of broodies in this section, as compared with the birds in single pens. There were two deaths in January—one in the light breeds from ovarian trouble, and one in the heavies from apoplexy. A number of the leading pens are still laying well. Mr. N. A. Singer made the highest score for the month with 153 eggs, Messrs. W. and G. W. Hindes coming second with 142 in the light breeds, while in the heavy breeds Mr. Burns was first with 140 eggs. The following are the individual records:—

Competitors.	Breed.	Jan.	Total.
LIGHT BREEDS.			
*N. A. Singer	White Leghorns ...	153	1,383
C. H. Singer	Do.	138	1,326
*W. and G. W. Hindes	Do.	142	1,246
*Bathurst Poultry Farm	Do.	110	1,156
*R. Gill	Do.	136	1,133
*S. L. Grenier	Do.	121	1,119
*G. Trapp	Do.	121	1,115
*J. M. Manson	Do.	126	1,108
*Mrs. L. Andersen	Do.	119	1,096
*W. Becker	Do.	111	1,095
*H. P. Clarke	Do.	127	1,094
*J. W. Newton	Do.	125	1,078
*W. A. Wilson	Do.	90	1,071
J. H. Jones	Do.	101	1,039
*C. Goos	Do.	117	1,037
*G. Williams	Do.	104	1,030
*R. C. Cole	Do.	110	1,023
*Oakleigh Poultry Farm	Do.	109	1,014
*T. Fanning	Do.	68	1,011
*R. C. J. Turner	Do.	113	1,009
A. G. C. Wenck	Do.	89	1,005
*F. Birchall	Do.	127	994
*Mrs. R. Hodge	Do.	102	992
*O. Goos	Do.	85	985
*H. Fraser	Do.	94	969
N. J. Nairn	Do.	86	943
*Mrs. E. White	Do.	98	941
*J. W. Short	Do.	79	938
*Thos. Taylor	Do.	100	933
*M. F. Newberry	Do.	69	928
T. H. Craig	Do.	111	924
B. Hawkins	Do.	71	914
*C. M. Pickering	Do.	74	907
*E. A. Smith	Do.	94	886
A. Maslin	Do.	79	885
J. Purnell	Do.	59	881
G. F. Richardson	Do.	71	837
B. C. Bartlem	Do.	74	830
E. Stephenson	Do.	82	829
E. Symons	Do.	90	825
H. Trappett	Brown Leghorns ...	93	812
Brampton Poultry Farm	White Leghorns ...	80	785
A. Anders	Do.	78	779
Parisian Poultry Farm	Brown Leghorns ...	61	530

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Jan.	Total.
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	140	1,240
*A. E. Walters	Do.	81	1,072
*T. Hindley	Do.	76	1,020
*C. C. Dennis	Do.	85	993
*E. F. Dennis	Do.	102	972
*R. Holmes	Do.	74	968
Jas. Hutton	Do.	104	966
Mrs. A. Kent	Do.	77	945
Mrs. A. E. Gallagher	Do.	87	928
*H. M. Chaille	Do.	57	918
R. Iunes	Do.	96	896
Mrs. L. Maund	Do.	101	876
H. B. Stephens	Do.	90	866
*Jas. Potter	Do.	68	858
Wambo Poultry Farm	Do.	81	817
*Parisian Poultry Farm	Do.	88	816
W. Becker	Chinese Langshans ...	67	816
V. J. Rye	Black Orpingtons ...	75	804
*Rev. A. McAllister	Do.	66	803
C. Doan	Do.	65	800
Jas. Hitchcock	Do.	60	766
C. Rosenthal	Do.	67	727
W. C. Trapp	Do.	66	684
R. Burns	Silver-laced Wyandottes	60	649
*J. E. Smith	Plymouth Rocks ...	38	569
*Miss L. Hart	Rhode Island Reds ...	50	493
Total ... ..	...	6,408	65,697

* Indicates that the pen is being tested singly.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total
LIGHT BREEDS.							
N. A. Singer	206	261	213	240	219	244	1,383
W. and G. W. Hindes	211	201	213	200	218	203	1,246
Bathurst Poultry Farm	156	179	209	201	225	186	1,156
R. Gill	206	201	208	195	150	173	1,133
S. L. Grenier	173	152	193	195	202	204	1,119
Geo Trapp	195	176	192	202	166	184	1,115
J. M. Manson	191	161	188	172	208	188	1,108
Mrs. L. Andersen	210	155	191	178	187	175	1,096
W. Becker	180	150	194	179	189	203	1,095
H P Clarke	182	168	184	200	178	182	1,094
J. W. Newton	194	187	208	165	184	140	1,078
W. A. Wilson	185	165	146	191	186	198	1,071
C. Goos	132	160	169	186	217	173	1,037
G. Williams	160	175	193	178	172	152	1,030
R. C. Cole	202	154	189	145	165	168	1,023
Oakleigh Poultry Farm	181	152	182	157	163	179	1,014
T. Fanning	133	171	186	169	219	133	1,011
R. C. J. Turner	182	153	182	174	176	142	1,009
F. Birchall	167	189	138	121	199	180	994
Mrs. R. Hodge	201	135	166	150	206	134	992
O. Goos	164	148	178	189	176	130	985

EGG-LAYING COMPETITION—*continued.*DETAILS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.

LIGHT BREEDS—*continued*

H. Fraser	164	185	157	142	146	175	969
Mrs. E. White	180	95	195	129	152	190	941
J. W. Short	154	151	174	146	153	160	938
Thos. Taylor	170	130	167	161	161	144	933
M. F. Newberry	155	130	139	200	136	168	928
C. M. Pickering	180	180	109	146	154	138	907
E. A. Smith	142	137	160	160	138	149	886

HEAVY BREEDS.

R. Burns	199	203	194	227	202	215	1,240
A. E. Walters	176	150	143	178	225	200	1,072
T. Hindley	146	172	115	220	218	149	1,020
C. C. Dennis	167	172	178	147	168	161	993
E. F. Dennis	144	164	189	98	182	195	972
R. Holmes	122	188	170	159	158	171	968
H. M. Chaille	159	167	175	134	177	106	918
J. Potter	142	149	156	142	157	112	858
Parisian Poultry Farm	96	135	160	108	156	161	816
Rev. A. McAllister	140	160	157	96	76	174	863
J. E. Smith	72	113	85	76	98	125	569
Miss L. Hart	81	105	64	105	62	76	493

CUTHBERT POTTS, Principal

ORIGIN OF SUPERPHOSPHATES.

The romance of Lyme Regis and the strange story of how its fossils, from which jewellery was once made, were later turned into superphosphates, was recently (says "Mark Lane Express") told by the vicar (the Rev. E. J. Meredith) at the annual dinner of the Yarcombe Agricultural Society. "When our grandmothers were girls," said Mr. Meredith, "a great trade in jewellery, in the form of brooches and earrings, made largely from fossils, was carried on in Lyme Regis, and about that time the then Dean of Westminster (Dr. Blackburn) paid a visit to the town. The dean, being a very inquisitive man with a scientific turn of mind, saw in Lyme a pretty Devonshire girl and took out her earrings—he must have been very close to her. The ear ornament contained a fossil and it occurred to the learned divine that he had discovered in the fossil something by which he could rejuvenate and revive the face of the earth. Collecting as many of these fossils as he could, the dignitary sent them to a great scientist, who pounded them down and discovered that they consisted of phosphate. A German scientist visited Lyme Regis and, as a result of his investigations, a treatise was written on this fossil manure, and the demand for the fossils was subsequently so great that the jewellery trade in the town soon went down with a bang."

General Notes.

A Desirable Vacuum.

Thus Sir William Beach Thomas (London "Times") in the current "Australia To-Day":—

The Australian climate—it seems to me the most perfect winter climate that man or woman could desire—is far the better. It is more sunny, less cold, more promotive of fertility, perhaps also of health. You can only grow food in Old England by stoking the soil with manure. Here it is thought much if 40 lb. of superphosphate—a bagatelle—is used per acre of wheat. But Australia produces little if any more grain than the minute British Isles; few if any more cattle, and very many fewer pigs. It is surely a miracle that, almost automatically, the pressure at Home does not force population into this most desirable vacuum.

The Unexpectedness of Australia—A Tribute to Queensland Workers.

Sir William continues:—

The utter unexpectedness of Australia, and indeed its contradiction of established reputation, came over me "in a flood" (like reformation over Henry V.) at Rockhampton, in Queensland, in the course of a journey to the sheep stations of the interior. At Bundaberg (Q.), where I had stopped a day or two, I saw immensely heavy crops of sugar growing in what seemed to me a temperate zone. The cane was being cut by an amazingly athletic group of men who, I fancy, along with fellow-workers on and about this coast, have the distinction of being the only white men in the world engaged in this occupation. Incidentally, it may be worth saying that on these sugar fields, as later in the shearing sheds beyond Blackall (the terminus of the "Turkey Express"), more effective energy was being exercised, per man per minute, than ever I saw before. Newspapers and talkers had succeeded in creating the impression that, generally speaking, work was at a standstill owing to a prevailing habit of going slow, of striking "on the job" or off the job. It was my particular good fortune to see work of a really athletic or gymnastic quality, performances that might quite fitly be compared with the forceful energy of Patterson on the lawn tennis court. It is at least a curious comment on modern civilisation that all the world should talk with admiration of the game-player, and no one at all of the shearer who was keeping up an average of 214 sheep a day. It recalls the comment of the great historian Thucydides, who recorded that the victorious General, Brasidas, was acclaimed by the people "almost as if he were an athlete." What a land Australia would be, even with its tiny handful of men and women, if those reputations of Patterson and the shearer were reversed.

A Departmental Appointment.

Mr. W. Rowlands, formerly fruit packing and grading expert of the Tasmanian Department of Agriculture, has accepted a similar position with the Queensland Government. Mr. Rowlands, in the course of his term of office in Tasmania, did a lot of good work for the fruit industry by teaching growers better methods of preparing their fruit for overseas and interstate markets, and by arranging classes for growers' children at various schools in fruitgrowing centres. Mr. Rowlands was born in Tasmania, and, after watching the various methods used in the different states of Australia, went to New Zealand to supervise the grading and packing of their apples intended for shipment to South America. It was due to his services that New Zealand apples established the name they have in the Argentine. The industry extended from 1,200 cases in 1909 to 50,000 in 1914. Mr. Rowlands was loaned to the Queensland Government last year to demonstrate to growers here better methods of marketing, and a similar request was made this year, but was turned down by the Tasmanian Minister for Agriculture. Subsequently the Queensland Government secured his services for the orchardists of the State. Mr. Rowlands enlisted in New Zealand during the early part of the war, and fought with the New Zealand Mounted Rifles at Gallipoli and was severely wounded during the evacuation.

The Cotton Industry—Special Legislation Foreshadowed.

“Special legislation for the cotton industry is under consideration.”

The Minister for Agriculture (Hon. W. N. Gillies) made this statement recently when the presence of so many pests which attacked cotton plants in Queensland was under discussion. Mr. Gillies said that the necessity for immediate action had not been forgotten, and consideration was at present being given to the question of whether something could not be done by means of the regulations under the Diseases in Plants Act.

The question of special legislation dealing with the cotton industry was also under consideration. The special Bill which would be necessary would be designed to foster and protect the industry, and deal with the whole question of ratoon cotton and pests.

Mr. Gillies thought personally that a lot of the pests thrived in dry weather. Fortunately we had not in Queensland a serious menace to the industry such as the boll weevil.

Ratoon Cotton—Ministerial Announcement.

“Now that the cotton-picking season is approaching, I desire to remind those growers who have retained ratoon cotton and wish to obtain the advance promised by the Government this season only, of 3d. a lb. on seed cotton, that certain conditions apply and must be observed,” said the Minister for Agriculture (Hon. W. N. Gillies) in the course of a recent departmental announcement. He added that it was imperative that growers of ratoon cotton should advise the manager of the ginnery of the despatch of such cotton and how it was marked to distinguish it from annual cotton. All bags or bales containing ratoon cotton must be marked with the letter “R” at least two inches long. Any grower mixing ratoon with annual cotton or sending ratoon cotton to the ginnery as annual cotton would forfeit any advance, and such cotton would not be ginned.

It must be understood that the advance of 3d. per lb. for ratoon cotton would only be paid for cotton of good quality as understood before the decision for the discontinuance had been made—that was, the cotton must be clean, free from disease, properly packed, and not immature, stained, dirty, or otherwise damaged. Ratoon cotton that reaches a ginnery and did not comply with the foregoing conditions might be rejected, or if accepted, the advances would be less than 3d.

The Minister desired it to be clearly understood that this was the last season during which any consideration whatever could be given to ratoon cotton, and that all ratoon cotton must be ploughed out or otherwise destroyed before next planting time. By the circumstances under which cotton was grown in this State, and from the knowledge of the danger from ratoon plants that had been gained since the advice of those with thorough knowledge of cotton cultivation had been at the service of the department, it was clear that ratooning had been a great mistake from a cultural point of view, as well as owing to the condemnation of the custom by the manufacturers. So clear had the position become that in the opinion of the Minister there was no hope of reopening the question of ratooning, even if, after experiments, no deficiency be found in the breaking strain of ratoon cotton fibre.

Testing Fertilisers—A Palmwoods Pineapple Plot.

Reporting on the pineapple experimental plot which has been established by the Government in the Palmwoods district, Mr. G. Williams (Instructor in Fruit Culture) said:—

“This plot is situated on the farm of Mr. Biggs, of Palmwoods. Conditions were variable and not altogether satisfactory. There was much variation in growth and condition, but the plants included in the higher ground were found most satisfactory. With the exception of one row, odd unhealthy plants were noted in all lines, the percentage increasing towards the lower row, and more particularly

in that part of the area which suggests a hollow or depression, where there is a possibility of soakage after heavy rains. There was not found to be any appreciable difference in the areas treated with sulphur. The effect of application was now very much less pronounced.

"The effect of the last application of fertiliser has not equalled previous applications, in which dried blood was the principal nitrogen. The soil is of a warm nature, made up largely of very fine sand, and the beneficial effect of ammonia sulphate or nitrate of soda would be modified according to weather conditions succeeding their applications, and more particularly as the soil is very deficient in humus. In view of the condition of the plot, experiments will be conducted further, and light applications of fertiliser will be applied during February, followed by a similar quantity in August. The manure to be used will have dried blood in the place of inorganic nitrogen."

Beerburrum Pineapples—Subsidy to Ex-Service Settlers.

In the course of a reply to a deputation of ex-service settlers at Beerburrum recently the Premier (Hon. E. G. Theodore) said it was a matter of surprise to him that the producers concerned in the pineapple industry should be so hesitant or reluctant to co-operate and utilise their combined resources, thus improving their own prices. The matter of the pool had been turned down—certainly not in Beerburrum, as he well knew—but by others, simply because they were a little more favourably placed. Prices would be stabilised with the establishment of a pool and proper operations would prevent under-selling, such as one firm had recently done in the South. The State Government had an obligation to the soldier settler, but on the other hand, it was not a good thing for the settlers to come to the Government and ask for the market to be subsidised. It was quite understandable for one season, but could not continue as a permanent institution. He was prepared to assist them this year to the same extent as last year, that was 1s. per case. It would cost the Government £3,000 out of consolidated revenue, and he was running the gauntlet of Parliament for appropriating money which had not been provided for. In reply to a question he said he took it that it would apply to all soldiers who gave their supplies to the State cannery.

Stanthorpe Tomatoes.

The Minister for State Enterprises (Hon. W. Forgan Smith), who visited Toowoomba and Stanthorpe recently, said, on his return, that the estimated crop under the pool is 250,000 cases. Of that number, about 80,000 cases will be made into tomato pulp at the Stanthorpe factory, and the balance marketed as fresh fruit.

Mr. Smith was accompanied on his trip by the Trade Commissioner (Mr. Austin). The visitors met the Stanthorpe Tomato Pool Board, and also the directors of the Stanthorpe Co-operative Canning Jam and Preserving Company, Limited.

"The State Government," says Mr. Smith, "has agreed to guarantee the bank in connection with the pulping operations to the extent of £8,000, and the agreement between the Treasurer and the Board in this connection was finalised by the Trade Commissioner during our visit. It is anticipated that pulping will commence within the next two weeks."

The Minister declared that the Stanthorpe tomato pulp bore a very good reputation amongst the canners generally, and no difficulty was anticipated in disposing of the whole of the pulp product at a satisfactory price. As regarded fresh tomatoes, marketing was proceeding very satisfactorily.

"From the whole of the Pool operations," he added, "it is estimated that upwards of £50,000 will be realised from the sale of the tomatoes."

Mr. Smith took the opportunity of visiting the Pikedale Soldiers' Settlement, and with the supervisor he was pleased to be able to meet a number of the growers and discuss matters personally with them. He formed a favourable impression of those settlers and from inquiries made he felt satisfied that the settlement would

eventually be a success. There was no doubt about the capabilities of the soil and the men and women who have set out to make a living there. The whole question was one of efficient marketing of the products in the interests of both producer and consumer.

Export of Apples—Interesting Experiments.

For some time the British Food Investigation Board has been carrying out experiments on various problems connected with the cold storage of apples, and it is expected that the results will be of considerable value to Australian exporters of that fruit. As regards temperatures, the conclusions arrived at are:—(a) that 1 degree C. is the most suitable temperature at which to store apples, and (b) that there is a critical point in the temperature at about 3 degrees C., below which loss is almost wholly confined to diseases due to physical surroundings and not to infection, whilst above the critical temperature loss is almost entirely due to infection by moulds.

Very valuable results have been obtained by storing apples in an atmosphere containing (a) from 5 per cent. of oxygen (as compared with 21 per cent. in normal air), and (b) from 12 to 15 per cent. carbon dioxide (as compared with minute traces in normal air). The success of this "gas" storage method depends on the automatic control of humidity and the circulation of the gas.

The Director of the Institute of Science and Industry (Mr. G. H. Knibbs) has received information from England that the Food Investigation Board has organised a small expedition of three highly qualified scientific men which will make the voyage to Australia and back for the purpose of investigating the conditions of transport of apples overseas, and testing different types of instruments for the registration of the temperature, humidity, and carbonic acid contents of the hold. The expedition is travelling by the steamer Moreton Bay, due at Fremantle on 2nd February.

Referring to the matter, Mr. Knibbs said recently that the Food Investigation Board had made a special study of the fungal and physiological diseases of apples in store, with results which are of both scientific and practical interest. Special attention was paid to "scald." This appears to be a physiological disease, the liability of which is intensified by too early gathering of the fruit. Fungal diseases appear to be due to spores present on the surface of the apple at the time of storage. The nature and extent of the "rots," therefore, is determined to a large extent by conditions in the orchard and to infection in the packing shed. The chief source of loss appeared to be due to the latter; therefore, sanitary conditions of handling and the possibility of disinfecting the fruit.

A Destructive Beetle.

Recently specimens of a tiny flying beetle, which had been discovered preying on cotton plants in the Beenleigh district, were submitted to the Government Entomologist (Mr. Henry Tryon) for identification. Two farmers in the yellowwood belt of the Beenleigh territory have reported considerable damage to their cotton crops by this insect. The case of one of them is typical, and may be cited. Mr. A. Brauer planted an experimental area of land with Egyptian seed last October. It came up very strongly, and advanced as high as 3 feet, until this leaf-eating beetle made its appearance. They worked from plant to plant in thousands, ate the leaf, also the blossoms, and even the bark off the boll, until there is none left; then the boll burst open, with the result that there is no cotton. Mr. Brauer tried to check them in every way. He lit fires to smoke them out, also tried arsenate of lead (1 lb. to 50 gallons of water), which did no good; and a stronger solution killed the plants. Mr. Brauer had the same beetle attack the blossoms on his fruit trees in a previous year. Mr. Berndt is the other farmer. He also has the beetles in his cotton taking everything before them; three years ago he had the same beetle in his lucerne crop. When it was mowed it had such a strong smell that the stock would not eat it.

Mr. Tryon at once identified the beetles, and declared them to be affecting a very large area of Queensland. In the course of his report Mr. Tryon said the insects

submitted to him are examples of a beetle named *Mono-Lepta rosca*—one that has already been met with this season in injurious relationship to cotton, from the Rockhampton area southwards almost to the border. Moreover, it is not only a depredator of cotton, but damages many other plants quite unrelated to it—*e.g.*, maize, mango (blossoms), grape (young fruit), plum (young fruit), orange, peach, rose, mulberry, and even dahlias. It also occurs on many native plants. The fact of lucerne being one of its food plants was, however, new to him.

It apparently lays its eggs in the soil, and there are some reasons for concluding that in grass lands amongst other places. However, the life history of the insect, which presents some technical difficulties in unravelling, has not been fully elucidated. Each female may deposit about fifty eggs about $\frac{1}{4}$ millimetre in length (H. Jarvis). And there are at least two broods here during the summer months.

This prolificness of the insect, and the fact that it is somewhat gregarious in its habits, accounts for the enormous numbers—with corresponding damage to plant life—that characterises its presence.

It may be killed by spraying with an arsenic containing compound—*e.g.*, Paris green or arsenate of lead, or either of these administered in a dry form. However, this involves consuming some leaf-tissue, and as fresh comers readily replace those that have succumbed, much foliage destruction may still result, so that little if any control in its ravages is exercised.

Even dense smoke only operates in banishing the insects from any spot, temporarily, since they are wont to repair to their former feeding grounds as soon as the smoke clears.

As was discovered some years since by Mr. Lamont, of Taringa, the *Mono-Lepta rosca* is attracted to light, and may be lured to its destruction. The employment of light suggests the use of a special trap; but the description of the procedure in making one of these light traps cannot be entered upon on this occasion, and the apparatus are not obtainable by purchase here at present.

An ordinary bright fire, or fires, in the field, as has already been demonstrated in the Rockhampton area, has proved the best procedure so far devised for its destruction, but one is loath to recommend resort to its use generally, as unless great care be exercised the risk of setting alight to the crop, too often grown amidst weeds, is one not to be ignored, especially where several of these fires have to be attended to.

Cotton Pests—Entomologist's Report.

Recently some insect-damaged cotton plants, together with specimens of the predatory insects, came to this Office from Mr. J. Bell, of Pine Mountain. The Government Entomologist and Vegetable Pathologist (Mr. Henry Tryon), after examination of the specimens, reported as follows:—

The principal insect implicated is the caterpillar of a small moth, a species of *Earias*, probably *E. Huegeli*, that is not an uncommon pest of our cotton fields. This not only feeds on the pith of the young green wood, especially at the base of the shoots, but, when a second generation is taking place, mines into the developing bolls and both penetrates the seed and cuts through the developing lint. The moth itself measures about $1\frac{1}{2}$ inches across the wings, the front pair of which are creamy-white with a brown band of green down their centres. It lays its eggs singly amidst the tender growth of its host plant, and the caterpillars hatching therefrom soon gnaw inwards into its soft tissue, and, feeding voraciously, arrive at full growth in about two weeks. These caterpillars are pale-green, conspicuously mottled with brown in patches, and are remarkable in possessing series of boss-like projections along their bodies, each terminating in a long bristle. This feature has led to the *Earias* caterpillar being termed the spiky or spiny cotton boll worm.

The nature of injury experienced by the young cotton plant from its attacks is thus described by Mr. W. A. T. Summerville: "The plants were about two months old and 1 foot 6 inches high. The field was damaged to the extent of about 3 per cent. The injured plants showed the younger growth and lateral shoots wilted, withered, and crumpled up, or even dead and darkened, and the young buds and shoots heavily falling off. On examining these more closely, it was noticed that the main stems were gnawed into and tunnelled through. Also that two kinds of caterpillars were present, one a mottled brown insect with blunt spines along its body, and the other a smaller smooth-bodied creature."

The caterpillar described as that of *Earias Huegeli* spins a peculiar close-woven, smooth brown cocoon, with steep sides, and projects to a point above—at one end. This is fastened low down upon the stem of the cotton plants or even on lumps of soil, the caterpillar making its exit from its food plant before fabricating it. Changing to a chrysalis within this, the insect, after about ten days or a fortnight since this metamorphosis has taken place, emerges as a moth. This injurious insect has at least two broods during the summer months in Southern Queensland, possibly three broods.

The second insect mentioned—"the smaller smooth-bodied caterpillar"—has not been so far identified, but there are some grounds for concluding that it is a scavenger named *Pyroderces*, which elsewhere frequents the parts of the cotton injured by the "spiny boll worm," and is represented in Queensland by an indigenous species.

The boll worm that is now being considered is best controlled by the systematic examination of the affected cotton patch, when the earliest symptoms of injury are being manifested, and then cutting out the affected shoots. (Note.—At the time the occurrence was noticed, it was already too late to do this with effect.) Later on, when the first crop has been harvested, the plants as a whole should be taken and burnt, and the ground ploughed, so as to bury any chrysalises and the cocoons harbouring them, that may occur from any earth clods or smaller objects that may occupy the soil surface. Probably in Queensland, as occurs also in India and Egypt, where species of this *Earias* cotton boll worm are met with, the plant depredator under notice is held in check to some extent by parasites that are especially operative against it when associated with one or other of the native plants whence the cotton has received it as a harmful insect.

Natural Enemies of Sugar-Cane Beetles in Queensland.

Supplementing the Sugar Notes in this issue is a series of coloured plates depicting some of the natural enemies of sugar-cane beetles in Queensland. These illustrations are taken from *Bulletin No. 13 of the Division of Entomology, Bureau of Sugar Experiment Stations, Queensland* (Dr. J. F. Illingworth), 1921. We are indebted to the Director of Sugar Experiment Stations (Mr. H. T. Easterby) and the delineator (Mr. Edmund Jarvis, Entomologist, Bureau of Sugar Experiment Stations, North Queensland), for permission to reproduce them in the Journal.

Answers to Correspondents.

"Roup (or Worms) of the Eye in Poultry."

J.W.M. (Mareeba)—

The Poultry Instructor (Mr. J. Beard) advises equal parts of tinct. of aloes and water. Instil a few drops three times daily. After three or four days the worms become absorbed. Or try—

One part argyrol in ten parts water. Instil a few drops once a day, and you will get the same results as above.

From my own experience, I find the following, if carried out properly, a sure thing:—As soon as you notice the inner membrane partly covering the eye get the bird and place the head on your knee and hold it firm, then place your thumb or index finger well back behind the eye, use pressure and work gradually forward and you will notice the worms appear in a bunch. Get them away and burn them, clean the eye well, then apply a few drops of kerosene, and they won't appear again if done properly. Don't neglect them until the cheesy matter adheres to the eye, and then expect to effect a cure. Attend to it in its first stages, and you may stamp it out altogether. Let me know results.

The Government Entomologist (Mr. H. Tryon) replies to queries as follows:—

White Ants.

Personally, I have concluded from my observations that in the cases of termites or white ants occurring in a house, and their access to the soil being prevented, they would succumb after not many days. To assure myself that this was what really happened under those circumstances, I consulted Mr. W. Street, whose knowledge of the habits of our South Queensland white ants is quite exceptional. He informed me then that these insects on their means of access being quite cut off die when isolated in houses, within six or eight days, but that the presence of a nest or "termitarium" within the house, and still intact, might make a slight difference in this respect. Should they continue to live after this period, the possibility of their still possessing some road by which they were reaching the soil might be anticipated. The existence of this, however, would be indicated by their manifesting their usual active habits when disturbed. The change in demeanour on their part—a sluggishness and inertness (taking the place of this) would, on the other hand, whilst as yet they were not dead, be a sign, especially to the trained eye, that their death would soon be realised. I should like to receive specimens, including the soldiers of the white ants that your correspondent has in his dwelling. They may belong to a species distinct from any one of those whose habits I have in view.

Beetle (*Isodon puncticalle*) Attacking Asters.

The insects submitted as possibly damaging the parts of the aster plants beneath the soil surface are undoubtedly capable of inflicting injury through gnawing the stem-axis or in larger roots arising from it. They are the adults of a rather common beetle named *Isodon puncticalle*, and the aster is not alone in being the victim of their depredations. Although met with beneath the surface it is only during the day that they effect a subterranean abode. With regard to remedial measures this small brown beetle is rather difficult to cope with. It was formerly anticipated that as they are to a slight extent attracted by light, they could be captured by trap-lanterns. However, experiments in which these have been used (a lamp suspended over a shallow dish of water having a film of kerosene on it) have given very poor positive results. Apparently, manure used in dressing the soil either before or after planting seems—by attracting the beetles with the odour it disseminates—to be to some extent responsible for their presence in numbers. Should this invariably be the case the use of a body whose odour would tend to mask that of the fertiliser might be indicated, especially one containing crude naphthalene (moth ball). Such a body we have in "vaporite" stocked by Messrs. Webster and Co. The use of this body for the purpose in view could then be assayed.

Farm Notes for March.

Land on which it is intended to plant winter cereals should be in a forward stage of preparation. Sowings of lucerne may be made at the latter end of the month on land which is free from weed growth and has been previously well prepared.

The March-April planting season has much in its favour, not the least of which is that the young weeds will not make such vigorous growth during the next few months, and, as a consequence, the young lucerne plants will have an excellent opportunity of becoming well established.

Potato crops should be showing above ground, and should be well cultivated to keep the surface soil in good condition; also to destroy any weed growth.

In districts where blight has previously existed, or where there is the slightest possible chance of its appearing, preventive methods should be adopted—i.e., spraying with "Burgundy mixture"—when the plants are a few inches high and have formed the leaves; to be followed by a second, and, if necessary, a third spraying before the flowering stage is reached.

Maize crops which have fully ripened should be picked as soon as possible and the ears stored in well-ventilated corn cribs, or barns. Weevils are usually very prevalent in the field at this time of the year and do considerable damage to the grain when in the husk.

The following crops for pig feed may be sown:—Mangel, sugar beet, turnips and swedes, rape, field cabbage, and carrots. Owing to the small nature of the seeds, the land should be worked up to a fine tilth before planting, and should contain ample moisture in the surface soil to ensure a good germination. Particular attention should be paid to all weed growth during the early stages of growth of the young plants.

As regular supplies of succulent fodder are essentials of success in all dairying operations, consideration should be given to a definite cropping system throughout the autumn and winter, and to the preparation and manuring of the land well in advance of the periods allotted for the successive sowings of seed.

The early planted cotton crops should be now ready for picking. This should not be done while there is any moisture on the bolls, either from showers or dew. Picked cotton showing any trace of dampness should be exposed to the sun for a few hours on tarpaulins, bag or hessian sheets, before storage in bulk or bagging or baling for ginning. Sowings of prairie grass and *phalaris bulbosa* (Toowoomba canary grass) may be made this month. Both are excellent winter grasses. Prairie grass does particularly well on scrub soil.

Dairymen who have maize crops which were too far advanced to benefit by the recent rains, and which show no promise of returning satisfactory yields of grain, would be well advised to convert these into ensilage to be used for winter feed. This, especially when fed in conjunction with lucerne or cowpea, is a valuable fodder. Where crops of sudan grass, sorghum, white panicum, Japanese millet, and liberty millet have reach a suitable stage for converting into ensilage, it will be found that this method of conserving them has much to recommend it. Stacking with a framework of poles, and well weighting the fodder, is necessary for best results. All stacks should be protected from rain by topping off with a good covering of bush hay built to a full eave and held in position by means of weighted wires.

Orchard Notes for March.

THE COASTAL DISTRICTS.

As soon as the weather is favourable, all orchards, plantations, and vineyards that have been allowed to get somewhat out of hand during the rainy season should be cleaned up, and the ground brought into a good state of tilth so as to enable it to retain the necessary moisture for the proper development of trees or plants. As the wet season is frequently followed by dry autumn weather, this attention is important.

Banana plantations must be kept free from weeds, and suckering must be rigorously carried out, as there is no greater cause of injury to a banana plantation than neglect to cultivate. Good strong suckers will give good bunches of good fruit, whereas a lot of weedy overcrowded suckers will only give small bunches of undersized fruit that is hard to dispose of, even at a low price.

The cooler weather will tend to improve the carrying qualities of the fruit, but care must still be taken to see that it is not allowed to become overdeveloped before it is packed, otherwise it may arrive at its destination in an overripe and, consequently, unsaleable condition. The greatest care should be taken in grading and packing fruit. Only one size of fruit of even quality should be packed. Smaller or inferior fruit should never be packed with good large fruit, but should always be packed separately.

The marketing of the main crop of pineapples, both for canning and the fresh fruit trade, will be completed in the course of the month, and as soon as the fruit is disposed of, plantations which are apt to become somewhat dirty during the gathering of the crop must be cleaned up. All weeds must be destroyed, and if blady grass has got hold anywhere it must be eradicated, even though a number of pineapple plants have to be sacrificed, for once a plantation becomes infested with this weed it takes possession and soon kills the crop. In addition to destroying all weed growth, the land should be well worked and brought into a state of thorough tilth.

In the Central and Northern districts, early varieties of the main crop of citrus fruits will ripen towards the end of the month. They will not be fully coloured, but they can be marketed as soon as they have developed sufficient sugar to be palatable; they should not be gathered whilst still sour and green. Citrus fruits of all kinds require the most careful handling, as a bruised fruit is a spoilt fruit, and is very liable to speck or rot. The fungus that causes specking cannot injure any fruit unless the skin is first injured. Fruit with perfect skin will eventually shrivel, but will not speck. Specking or blue mould can therefore be guarded against by the exercise of great care in handling and packing. At the same time, some fruit is always liable to become injured, either by mechanical means, such as thorn pricks, wind action, hail, punctures by sucking insects, fruit flies, the spotted peach moth, or gnawing insects injuring the skin. Any one of these injuries makes it easy for the spores of the fungus to enter the fruit and germinate. All such fruit must therefore be gathered and destroyed, and so minimise the risk of infection. When specky fruit is allowed to lie about in the orchard or to hang on the trees, or when it is left in the packing sheds, it is a constant source of danger, as millions of spores are produced by it. These spores are carried by the wind in every direction, and are ready to establish themselves whenever they come in contact with any fruit into which they can penetrate. Specking is accountable for a large percentage of loss frequently experienced in sending citrus fruits to the Southern States, especially early in the season, and as it can be largely prevented by the exercise of the necessary care and attention, growers are urged not to neglect these important measures.

Fruit must be carefully graded for size and colour, and only one size of fruit of one quality should be packed in one case. The flat bushel-case (long packer) commonly used for citrus fruits, does not lend itself to up-to-date methods of grading and packing, and we have yet to find a better case than the American orange case recommended by the writer when he came to this country from California in 1892,

and which again proved its superiority in the recent shipment of oranges from South Australia to England. Failing this case, a bushel-case suggested by the New South Wales Department of Agriculture is, in the writer's opinion, the most suitable for citrus fruits, and were it adopted it would be a simple matter to standardise the grades of our citrus fruit, as has been done in respect to apples packed in the standard bushel-case used generally for apples throughout the Commonwealth. The inside measurements of the case suggested are 18 in. long, 11½ in. wide, and 10½ in. deep. No matter which case is used, the fruit must be sweated for seven days before it is sent to the southern markets, in order to determine what fruit has been attacked by fruit-fly, and also to enable bruised or injured fruit liable to speck to be removed prior to despatch.

Fruit-fly must be systematically fought in all orchards, for if this important work is neglected there is always a very great risk of this pest causing serious loss to citrus growers.

The spotted peach-moth frequently causes serious loss, especially in the case of navel. It can be treated in a similar manner to the codlin moth of pip fruit, by spraying with arsenate of lead, but an even better remedy is not to grow any corn or other crop that harbours this pest in or near the orchard. Large sucking-moths also damage the ripening fruit. They are easily attracted by very ripe bananas or by a water-melon cut in pieces, and can be caught or destroyed by a flare or torch when feeding on these trap fruits. If this method of destruction is followed up for a few nights, the moth will soon be thinned out.

Strawberry planting can be continued during the month, and the advice given in last month's notes still holds good. Remember that no crop gives a better return for extra care and attention in the preparation of the land and for generous manuring than the strawberry.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The advice given in these notes for the last few months regarding the handling, grading, and packing of fruit should still be carefully followed. The later varieties of apples and other fruits are much better keepers than earlier-ripening sorts, and as they can be sent to comparatively distant markets, the necessity for very careful grading and packing is, if anything, greater than it is in the case of fruit sent to nearby markets for immediate consumption. Instruction in the most up-to-date methods of grading and packing fruit has been given in the Granite Belt area in the course of the present season by Mr. Rowlands, the Tasmanian Fruit Packing Expert, whose services the Queensland Government have been fortunate in securing, and whose practical advice and instruction should enable the growers in that district to market their produce in a much more attractive form.

The same care is necessary in the packing of grapes, and it is pleasing to note that some growers are packing their fruit very well. Those who are not so expert cannot do better than follow the methods of the most successful packers.

Parrots are frequently very troublesome in the orchards at this time of the year, especially if there is a shortage of their natural food. So far, there is no very satisfactory method of combating them, as they are very difficult to scare, and, though shooting reduces their numbers considerably, they are so numerous that it is only a subsidiary means.

As soon as the crop of fruit has been disposed of, the orchard should be cleaned up, and the land worked. If this is done, many of the fruit-fly pupæ that are in the soil will be exposed to destruction in large numbers by birds, or by ants and other insects. If the ground is not worked and is covered with weed growth, there is little chance of the pupæ being destroyed.

Where citrus trees show signs of requiring water, they should be given an irrigation during the month, but if the fruit is well developed and approaching the ripening state, it is not advisable to do more than keep the ground in a thorough state of tilth, unless the trees are suffering badly, as too much water is apt to produce a large, puffy fruit of poor quality and a bad shipper. A light irrigation is therefore all that is necessary in this case, especially if the orchard has been given the attention recommended in these notes from month to month.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1923.	JANUARY.		FEBRUARY.		MARCH.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5.1	6.49	5.25	6.46	5.45	6.24
2	5.2	6.50	5.26	6.46	5.46	6.23
3	5.3	6.50	5.27	6.45	5.47	6.22
4	5.3	6.50	5.28	6.44	5.47	6.21
5	5.4	6.50	5.29	6.43	5.48	6.20
6	5.5	6.51	5.30	6.43	5.48	6.19
7	5.5	6.51	5.30	6.42	5.49	6.17
8	5.6	6.51	5.31	6.41	5.49	6.16
9	5.6	6.51	5.32	6.40	5.50	6.15
10	5.7	6.51	5.33	6.39	5.50	6.14
11	5.8	6.51	5.33	6.39	5.51	6.13
12	5.9	6.51	5.34	6.38	5.51	6.12
13	5.10	6.51	5.35	6.38	5.52	6.11
14	5.11	6.51	5.36	6.37	5.53	6.10
15	5.12	6.51	5.36	6.36	5.54	6.9
16	5.12	6.51	5.37	6.35	5.54	6.7
17	5.13	6.51	5.38	6.35	5.55	6.6
18	5.14	6.50	5.38	6.34	5.56	6.5
19	5.15	6.50	5.39	6.33	5.56	6.4
20	5.16	6.50	5.40	6.32	5.57	6.3
21	5.16	6.50	5.40	6.32	5.57	6.2
22	5.17	6.50	5.41	6.31	5.58	6.0
23	5.18	6.49	5.41	6.30	5.58	5.59
24	5.19	6.49	5.42	6.29	5.59	5.58
25	5.20	6.49	5.42	6.28	5.59	5.57
26	5.20	6.48	5.43	6.27	6.0	5.56
27	5.21	6.48	5.44	6.26	6.0	5.55
28	5.22	6.47	5.45	6.25	6.1	5.53
29	5.23	6.47	...	...	6.1	5.52
30	5.24	6.46	...	...	6.2	5.51
31	5.25	6.46	...	...	6.2	5.50

PHASES OF THE MOON, ECLIPSES, OCCULTATIONS, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer" Time is not used.

3 Jan. ○ Full Moon 12 33 p.m.
 10 " ☾ Last Quarter 10 55 a.m.
 17 " ● New Moon 12 41 p.m.
 25 " ☾ First Quarter 1 59 p.m.

Perigee on 8th at 9.51 p.m.
 Apogee on 23rd at 11.24 p.m.

On 3rd January at 9 a.m. the Earth will be in perihelion, its least distance from the Sun about 91,300,000 miles. Three days later Venus will be in perihelion, and will be about 17,000,000 miles further from the Earth than it was on 25th November when in perigee.

On 29th January Mercury will be passing to the west of the Sun about 4 degrees on its northern side.

2 Feb. ○ Full Moon 1 53 a.m.
 8 " ☾ Last Quarter 7 16 p.m.
 16 " ● New Moon 5 7 a.m.
 24 " ☾ First Quarter 10 6 a.m.

Perigee on 4th at 5.18 p.m.
 Apogee on 20th at 6.18 p.m.

On 4th February Venus, apparently on the western border of Sagittarius, will be at its greatest western elongation, about 47 degrees from the Sun. On the 6th, soon after sunset, Saturn will be occulted by the Moon when below the horizon, but about four hours later the Moon, Saturn, and Spica will be apparently near to one another low down in the east.

3 Mar. ○ Full Moon 1 24 p.m.
 10 " ☾ Last Quarter 4 31 a.m.
 17 " ● New Moon 10 51 p.m.
 26 " ☾ First Quarter 2 42 a.m.

Perigee on 4th at 8.48 p.m.
 Apogee on 20th at 6.24 a.m.

The Moon will be partly eclipsed on the afternoon of 3rd March, and there will be an annular eclipse of the Sun on the 17th, but neither will be visible in Australia.

Saturn will be occulted by the Moon about 2 a.m. on 6th March, when apparently near to the bright star Spica in the constellation Virgo. This fine combination of celestial objects will be then high up in the sky, nearly overhead.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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PART 3.

Event and Comment.

The Current Issue.

Readers should find the current Journal a most interesting one. Foremost among the special articles is the first of a series on agricultural organisation, covering an account of American co-operative associations and a comparison of them with the Queensland Producers' Association, written from on-the-spot studies by Mr. J. D. Story, who visited California recently on behalf of the Queensland Government. Cotton-growing is served with comprehensive and seasonable matter. As our greatest agricultural interest sugar is, as usual, well covered. Mr. Easterby contributes a timely comment on the industry, and Mr. Edmund Jarvis's science notes are particularly interesting. The first instalment of a special series on fertilisers and manures is very informative, and is designed as a source of material for a course of lectures to farmers to be inaugurated shortly. A review of a year's activities in the Stock Division and the Pure Seeds and Stock Foods Section throws a strong light on the doings of industrious and little-advertised branches of the Department. "Stud Stock Studies" is a new illustrated feature designed to present pictorially types of leading dairy cattle breeds with the object of, in a measure, stimulating and maintaining interest in dairy herd improvement. Illustrated notes on Queensland trees and weeds are also, among numerous other matters, of current importance.

Economic Education and Commonsense Co-operation.

Agriculture is the first industry in the State—as a fact, it is the first industry of any country—and its prosperity has the greatest direct and indirect influence upon conditions affecting the national welfare. It is the industry that deals with the most valuable, the most lasting, and at the same time the most elastic of our material resources—the fertility of the soil. It is the industry that naturally appeals to all of us, for most of our national traditions are rooted in the soil. And yet in spite of its strong appeal to natural industrial instincts, and its strong hold upon the traditional imagination of the people it is so sorely beset with difficulties that land settlement has grown into a problem, and the retention of pioneer settlers on their holdings a problem just as great. The economic weakness of the agricultural industry is one of the great causes of urban congestion and rural declension. What the industry insistently calls for is the marking and traversing of the right economic path, fresh application of science, bolder initiative, and effective education—the sort of education that gives not only technical knowledge, but the mental equipment that enables men to respond with a quick intelligence when new ideas of value are placed before them, and to reject those that are merely plausible; the sort of education that gives a greater insight into the economic forces that affect

their industry, the delicacy and intricacy of modern commercial machinery, and a broader outlook over the field of industrial opportunity. True co-operation as applied to the agricultural industry has never yet been properly tried out; it has never yet really had an open chance. There have, it is true, been many significant individual successes—successes, however, balanced by some significant failures. The great desideratum is State-wide commonsense co-operation on broad plain ordinary horse-sense lines, and in the Queensland Producers' Association Queensland farmers have now a lever for, and a great opportunity of, placing their industry in the position of natural and national pre-eminence that it should rightly occupy.

The Sugar Industry.

One of the outstanding events of the month was the visit of the Queensland Sugar Delegation to Melbourne to place before the Prime Minister the facts affecting the contemplated alteration of conditions governing the economic side of the sugar industry. The Minister for Agriculture and Stock (Hon. W. N. Gillies) led the delegation and pressed for a renewal of the Federal agreement under which the industry had become to a large extent stabilised. His task was a difficult one for Southern hostile influence, based on ignorance of facts, failure to outgrow erroneous opinions formed and policies advocated in pre-Federal days, and Press prejudice sedulously cultivated, opposed bitterly the continuance of the present sugar agreement. Mr. Gillies expressed surprise that there are Australians to-day who have not yet realised that the doctrine of "White Australia" has passed from an ideal to an actuality through the agency of the Queensland sugar industry, that both the kanaka and large plantations have long since disappeared, and that in their stead are small farms owned and worked almost exclusively by men of their own colour, race, and ideals. The industry to-day, re-emphasised Mr. Gillies, had become the greatest bulwark of our national safety. Australia is the one country in the world to-day that grows sugar-cane successfully and manufactures it into sugar by white labour and under white labour conditions. Queensland has hundreds of thousands of acres of land with a climate and rainfall suitable for sugar-growing equal to that in any part of the world. Other points in favour of renewal of the agreement or adoption of the submitted tariff alternative were stressed strongly by other members of the delegation, who represented directly every section of the sugar industry. The Prime Minister, in the course of his reply, said that the Federal Government realised fully the value of the industry both economically and nationally; he held out no hope for the renewal of the agreement, but promised that the industry would be safeguarded fiscally.

Fighting Drought.

The Council of Agriculture has submitted to the Government a comprehensive scheme of fodder conservation with a view to the preservation of dairy herds during prolonged dry spells. The scheme is regarded as the overture in a complete anti-drought campaign designed to protect all agricultural and pastoral activities in lean years.

Central Dumps Favoured.

The Council is of opinion that storage of baled lucerne hay and the production of ensilage will be found to be satisfactory methods of fodder conservation. Provision for the latter would have to be made on farmers' holdings, while in the matter of storage of lucerne hay the Council is of opinion that it would be necessary to provide for central storage dumps at railway sidings and other central points to provide for important settlements located some distance from railway lines. Although lucerne hay can be held with much greater safety than some other fodders, and is indeed good security for an advance, it might also be found practicable to conserve other fodder such as wheat or oats in bulk, cereals, and so on, and in any Act of Parliament establishing the scheme, power should be given to the controlling body to undertake such conservation, if deemed advisable. While the Council strongly favours the storage by farmers of reserves of hay on their own holdings, it advises against embracing within a comprehensive fodder conservation scheme any provisions covering the storage of hay on farms. It is felt that the matter of advances to encourage the storage of hay on farms is the proper sphere of private financial institutions, or of a rural credit system if established. Even for such bodies as these, the security for advances specifically to enable farmers to hold hay on farms would not be a good one, and inspection to ascertain the quantity on which the advance should be made, and to provide for adequate protection of the security, would be extremely costly.

The Question of Finance.

The Council has considered four methods of financing the scheme, namely:—

- (a) Power to the controlling body to issue bonds (or debentures) to the public.

- (b) A fodder pool to be constituted, the producers retaining an interest in the fodder getting a small advance at time of delivery and participating in final distribution.
- (c) Offer of debentures for sale to producers likely to use fodder with or without Government subsidy.
- (d) Capitalisation of fodder conservation scheme by the Government or of loan funds.

The Council is of opinion that the method under (b) above is not advisable. This is further commented upon in clause 15 hereof.

Method under (c) is deemed entirely impracticable.

The Council favours the methods under (a) and (d).

The total finance required to carry out a scheme of the magnitude herein suggested would probably reach the figure of 3½ million pounds sterling. This would not all be required at the outset, but should be gradually made available as storage proceeds. Probably an average of £700,000 per annum for the first five years would enable the objective to be attained. This may at first sight seem an inordinately large expenditure, but when regard is had to the immense losses entailed by calamitous droughts, it is believed that even opponents of such a scheme cannot but concede the proposals to be a sound business proposition.

Strictly Cash Basis.

It is strongly urged that no fodder should be sold except for cash. If relief be essential in necessitous cases under drought conditions, the private financial institutions, State Advances Corporation, or a system of rural credit should place the farmer in a position to purchase fodder from the Fodder Conservation Board for cash. If any other system be followed, there would be a tendency for the Fodder Conservation Board to find its capital locked up in debts due by sundry debtors, thereby making it impossible for the board to repurchase stocks following upon depletion. If care be not exercised there is a danger of the Fodder Conservation Board becoming an ordinary banking institution, and the essential of fodder conservation would tend to be lost sight of.

Suggested Conservation Board.

The Council recommends that the business of fodder conservation be undertaken by a body to be designated the Fodder Conservation Board, and that the capital provided be vested in the board as trustees of the fund. A special Act of Parliament would be necessary governing the operations of the scheme. The Council recommend that all members of this board be appointed by the Government, and suggests that in the constitution of such boards provision be made for not fewer than two out of five or three out of seven being *bonâ fide* primary producers.

It is recommended that all matters affecting advances for the purpose of building silos on farms be transferred from Government Departments at present undertaking that service to the Fodder Conservation Board, as the latter body would be concentrating upon all aspects of fodder conservation.

The Council is of opinion that at the inception of the scheme hay for storage should be purchased straight out by the Fodder Conservation Board. It is of opinion that the retention by the deliverer of the hay of any interest in the hay delivered is not advisable. The price paid should be such as to remunerate the producer, and to enable the Fodder Conservation Board to become sole owner of the fodder they control.

Question of Mortgages.

It is pointed out that many farms, on which silos should be constructed, are already mortgaged to banks, private institutions, or to the State Advances Corporation, and some difficulty attaches to the matter of providing good security. This, it is thought, however, may be afforded by one of the following methods, namely:—

- (a) Legislative enactment, providing that advances for silos shall have priority over all other encumbrances.
- (b) Enactment, providing that the land on which silos are constructed, with right of access, shall be transferred to the Fodder Conservation Board.
- (c) Equal rights in *pari passu*, with existing mortgage, or
- (d) Second mortgage.

The method under item (c) is favoured by the Council, on the ground that the institution of a fodder conservation scheme would extensively buttress the security of existing mortgagees, and as the amounts advanced for silos would not be large, existing securities would be improved rather than prejudiced.

ORGANISATION OF THE AGRICULTURAL INDUSTRY IN QUEENSLAND—I.

By J. D. STORY, Chairman Administrative Committee, Council of Agriculture, and J. F. F. REID, Editor of Publications, Department of Agriculture and Stock.

This is the first of a series of articles, prepared especially for the Journal, crystallising the results of investigations and studies of Californian methods of Agricultural Organisation, Administration, and Education. In this instalment the American system is described and compared with the plan of the Queensland Producers' Association—the outcome of the great agricultural advance of last year and the movement towards stabilised rural industry, which is gathering momentum every week in this State.—Ed.

Queensland is very largely dependent for her national existence upon her primary industries. She is desirous of filling her empty spaces and of establishing a vigorous and reasonably contented rural population. In that direction lies national safety and national prosperity. To accomplish that end farming must be made worth while; producers must receive a fair return for their labour; the country must be made as attractive in its way as the town; the lot of country women must be improved; the child of the country must be given the same advantages as the child of the city. When the prosperity of the producer is increased appreciably much will have been done to secure those objects, and three of the factors which will contribute mainly towards that prosperity are good seasons, suitable agricultural education and instruction, and efficient organisation.

Man does not control the seasons, but there is much which man can do to protect himself from the effects of adverse seasons. Experience, education, instruction, and organisation will help him. The experience he will gain for himself and through others. The Department of Agriculture provides instruction through the visits, demonstrations, and bulletins of its officers. As that instruction means so much to the farmer, it is obvious that the instruction should be sound; it is further obvious that if the instruction is to be sound it is essential that only qualified men should be appointed, and if the juniors of to-day are to become the seniors of to-morrow, those juniors must be trained efficiently. Hence the Queensland University should assist in the matter of research and of higher agricultural education.

"The Primary Producers' Organisation Act of 1922" has been passed by Parliament to provide for a unified organisation of the primary producers of Queensland, and the two cardinal principles of that organisation are to be—"Home Rule," namely, control by the producer for the producer—and "Co-operation." In regard to both instruction and experience organisation can be of great or little assistance according to the support which its members are prepared to give it. The Queensland Council of Agriculture is already trying to assist producers by the formulation of schemes for dealing with urgent and vital problems.

So far, the operations of the Q.P.A. have been directed by a provisional council representative of the various sections of the agricultural industry. Reports of the activities of the association have appeared from time to time in the Press, and those activities need no comment here. The L.P.A.s have been formed, the district councils have been elected, and the new Council of Agriculture will shortly be constituted; the time is therefore opportune to consider what precisely are the functions which each section of the organisation will discharge.

THE AMERICAN SYSTEM.

As a guide, a review of the American Farm Bureau and Farm Adviser movement may be interesting and helpful.

The Move Towards Rural Stabilisation.

Farm bureaux are a natural growth of the desire of the American farmers to do two things—first, to unite for mutual self-help and co-operation along any line that may be needed, and second, to get into close touch with those institutions of public enterprise and of government which have accumulated the information necessary to make farm life prosperous. The farm bureaux have no other function than to aid the development of rural life which, in turn, is the greatest stabiliser of national existence.

At various stages of the development of American agriculture many types of farmers' organisations have been brought into existence. Some have been successful; many have failed. That failure has usually been due to one or more causes—lack of a distinct purpose to fill a definite need, lack of membership sufficiently representative of all classes of farmers, lack of co-operation with similar organisations, lack of continuous and unselfish leadership. The farm bureau, it is claimed, has benefited by the experience of other organisations. It is not a social organisation, not an association for the purpose of lowering the prices of farm requisites and raising the prices of farm products, but an association of farmers who, by mutual co-operation, wish to investigate the fundamental problems involved in agricultural production.

Systematic Observation, Research, Experiment, and Record.

The theory that led to the farm bureau movement is that many of the farm problems have already been solved by individual farmers throughout the nation, but the solutions usually fall out of sight unnoted or are known only to particular individuals. Under the farm bureau scheme an attempt is being made to gather together in one county organisation the wide-awake and interested farmers who will compare their results with those of others, and in a systematic way plan out experiments and demonstrations on their own farms. Thus, the farm bureau may become a great experiment station with many observers, and a trained man—the farm adviser—to assist in interpreting results, point out new avenues of work and deduce conclusions from the evidence available. The conclusion is that the farm bureau can be of greater value to the community than the farm adviser and that together they can be of greater benefit than either alone. Though it must be emphasised that the main purpose of the farm bureaux is to increase the local knowledge of agricultural fact, many organisations act as general guardians of rural affairs and take the lead in advocating good roads, better schools, cheaper methods of buying and selling, and in promoting social institutions of country life.

A Live Factor in Rural Progress.

In some States the farm bureaux were not at first promoted by agricultural colleges, but were looked upon as a somewhat dangerous and untried procedure which might wreck the move for agricultural extension by paid workers. Later, this fear passed and the Colleges of Agriculture came to welcome the farm bureau as they saw more fully its possibilities of development and the progress which might be made in agricultural extension work when it was furthered by a large body of farmers. In the State of California, however, the value of the farm bureau was recognised from the beginning, and the College of Agriculture required every county which requested the services of a farm adviser to first form a farm bureau. The wisdom of this step has been proved by the fact that no county of California which has taken up farm bureau work has abandoned that work.

Farmers Control Their Own Affairs.

In planning the California type of bureau the constitution was very carefully written in order that no Federal or State official might have any direction over it. The organisation was definitely placed in the hands of farmers elected from among their membership and representing agricultural communities of the county. The belief upon which the constitution was based was that the farmers were wholly competent to guide their own affairs. As to its permanency, the theory was that if organisations

could be formed which would have programmes of work based upon concrete and feasible projects for the development of the community, the county, the State, and the Nation, the farmers would continue to attend meetings because of the efficiency of the organisation and because of their interest and part in the work it was doing. While the method under which the community centres are organised and directed is the same throughout the State, yet because the problems of the communities differ, the projects they have stressed are widely divergent.

Meetings—Farm Prosperity—Agricultural Policy.

The meetings of the community centres are usually held monthly. They are sometimes open to the public, but the business of the meetings is the serious discussion of questions pertinent to the farm prosperity of the neighbourhood. Sometimes the members go for a well-planned day to see demonstration plots that show definite results or to look at a well-built barn or well-bred herd. Such a trip is an inspiration as well as a source of knowledge, but it must be undertaken with a serious purpose and not as a pleasure jaunt. Again, some of the meetings are devoted entirely to the study of some phase of agricultural practice, such as the use of lime, sprays and spraying, balanced rations, methods of testing seeds, and so on—the farm adviser explaining in detail and using a blackboard, if necessary. The directors and officers of the county bureau also meet every month at the bureau offices or at the farm adviser's office. The meetings are of such vital interest that the whole of the directors attend—the agricultural policies of the county are determined, sectional committees are appointed, reports are heard from each director representing a centre and from departmental committees, and general consideration is given to the plans of work to be undertaken by the bureau and the farm adviser. The meetings may or may not be open to the public.

Subsidiary Organisations.

In addition to the general organisation, the members of the centres may form subsidiary organisations for more frequent meetings or more direct work in special directions. Thus, for example, the dairymen may wish to carry on co-operative cow testing, to purchase pure-bred sires; the pig raisers may wish to stamp out disease or to specialise in one breed of swine; the alfalfa growers may desire to uniformly grade their hay or to store it in co-operatively owned storehouses; and it becomes necessary to establish several departments or sections within the community centre. Each section elects a section committee, which reports through the director representing the centre to a corresponding committee of the county bureau, which in turn reports to the whole bureau, which is the final court to consider plans and reports of the several sections. It is in this way that the united agricultural force of the whole county is given to enterprises undertaken by any section, and financial, moral, and universal backing is given to a group of men who, standing alone, would not have sufficient strength to accomplish effectively the desired end.

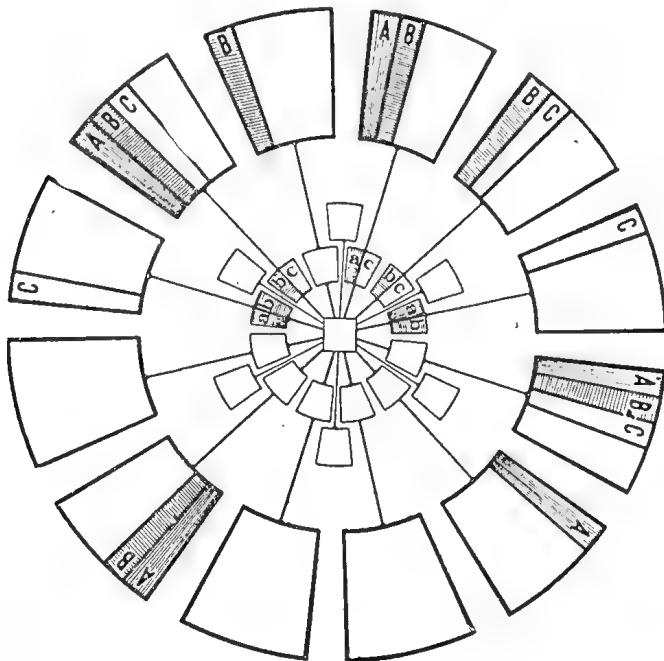
The Largest Farmers' Organisation in the World.

State Federations, consisting of representatives of the county bureaux, and a National Federation consisting of representatives of the State Federations are also in existence, and a member on joining becomes part of the largest farmers' organisation that the world has ever known, and which includes some 1,500,000 members, 1,600 county bureaux, and 45 State Federations.

Summarised, the complete organisation is as follows:—

- (1) Farm Bureau Centres, consisting of local farmers, who deal with local problems;
- (2) County Farm Bureaux, consisting of representatives of the Farm Bureau Centres, who deal with county problems;
- (3) State Federations, consisting of representatives of County Farm Bureaux, who deal with State problems;
- (4) A National Federation, consisting of representatives of State Federations, which deals with national problems.

The following diagram illustrates the organisation of the county (district) bureau:—



- A = Swine Breeders' Committee of the Farm Bureau Centres.
 a = Swine Breeders' Committee of the County Farm Bureau.
 A + a = Swine Breeders' Department of the Farm Bureau.
 B = Cow Testing Committee of the Farm Bureau Centres.
 b = Cow Testing Committee of the County Farm Bureau.
 B + b = Cow Testing Department of the Farm Bureau.
 C = Any Committee of the Farm Bureau Centres.
 c = The same Committee of the County Farm Centres.
 C + c = The same Department of the Farm Bureau.

THE FARM ADVISER.

Personality, Training, Qualifications.

A Farm Adviser is an official whose business it is to make available in practical form the results of the best-known farm practice and the knowledge of agricultural science, as developed by the State Experiment Stations and the Federal Department of Agriculture. He is expected to show by field demonstrations, publications, and otherwise, the application of such knowledge to local farm conditions. The Farm Adviser helps the settler or the beginner in the better selection of ground for certain crops, in better methods of planting, cultivating, pruning, spraying, harvesting, and marketing; he gives advice on soil treatment, fertilisation, animal husbandry, &c. Under the Californian system, the Farm Adviser is an officer of the Extension Service of the University College of Agriculture, and he is directly responsible to the Director of the Extension Service. His salary is paid by the College and the Federal Department of Agriculture co-operating. His travelling expenses are paid by the county to which he is attached. The most suitable Farm Adviser is the man who has been trained in agriculture, who is a graduate of a College of Agriculture, who has had practical experience, and who is familiar with the problems which concern the particular locality. It is essential that he should

possess enthusiasm, energy, and tact. As the success of agricultural extension work depends so much upon the Farm Advisers, the College will not appoint men until it is satisfied that they are qualified; rather will the College leave vacancies unfilled until efficient men are available. The Farm Adviser now works in conjunction with the Farm Bureau; in fact, a Farm Adviser is not appointed until a Farm Bureau has been organised. This arrangement has been made so as to facilitate the work of the Adviser, to conserve his time, to extend the range of his activities, and to provide an organisation to reach easily and quickly every community in the county. Under this scheme, also, the Farm Adviser himself gets the counsel and advice of the best farmers in the county, in addition to the assistance of the whole of the forces of the Agricultural College and the Federal Department of Agriculture.

Relationship of Farm Adviser to the Farm Bureau.

The value of the Farm Adviser to the producers is in having the unbiased judgment of an official who does not represent a local situation or local constituency, who is not subject to purely local control, whose appointment and term of office are not determined locally, but who represents the organised agricultural forces of the State and the knowledge that they have concerning the betterment of rural life. His value to the producers is in precise proportion to the extent to which he knows and tells the truth. He may advise the farm bureau (upon its request) as to the procedure which it may best follow, and may co-operate with it on most of the projects that it has under study, but in doing so it must be recognised that he is an official working for the benefit of the whole people.

On the other hand, the farm bureau is directed by the farmers through their representatives, who are directors of the bureau. When that bureau desires to carry on a project which is part or wholly in the nature of agricultural extension, then that part may properly come within the scope of the Farm Adviser. It may then draw up a written plan setting forth the work to be done, the means by which it is to be done, and the results they hope to accomplish, and clearly distinguish which part is to be done by the farm bureau, and which part by the Farm Adviser. This brings them into active co-operation on that particular project, but does not necessarily mean that the farm bureau will always work with the Farm Adviser, nor that the Farm Adviser is compelled to join in every movement that the farm bureau desires to further. To attempt to put the farm bureaux under the direction of the Government would deprive them of the primary reason for their existence, which is to represent the free and untrammelled action of the farmers of the country. Likewise, it would be unfortunate for the farm advisers to be placed under the direction of the bureaux, since it would deprive the farm advisers of their true mission, which is the advancement of the whole of the agricultural industry.

ORGANISATION IN QUEENSLAND.

What, then, can Queensland learn from the American organisation?

The American Farm Bureau organisation is very similar to our Queensland Producers' Association. The American Farm Bureau centres correspond with our Local Producers' Associations, the County Farm Bureaux with our District Councils, and the State Federation of Farm Bureaux with our Council of Agriculture. The Farm Adviser will not correspond exactly to our District Agents, but rather with the Instructors and Experts employed by the Department of Agriculture and Stock.

Co-Operation of the Queensland Producers' Association with the Department of Agriculture and Stock.

Under the Californian system the Farm Adviser is an officer of the College of Agriculture of the University of California. Seeing, however, that there is not a College of Agriculture in the Queensland University, then, so far as agricultural experts are concerned, the Queensland Department of Agriculture and Stock stands to the Queensland agricultural industry in the same relationship as the Californian College of Agriculture stands to the Californian agricultural industry. Seeing that

our experts and instructors are State officials, the control of them must remain with the State, but in the allotment of their duties, and in the making of the best use of their services for the benefit of the industry, there would be as cordial co-operation between the Council of Agriculture and the district councils on the one side and the Department of Agriculture on the other side as there is between the Californian Farm Bureaux and the Californian College of Agriculture. The Department of Agriculture would welcome an arrangement of the kind, provided that it were clearly understood that the control of the departmental officials must remain with the Department.

Efficient Administration.

For the effective discharge of the functions entrusted to the district councils and local producers associations by the P.P.O. Act, it is essential that an efficient administrative official should be attached to each district council—that official, whilst working under the direct control of the district council, however, should be an officer of the Council of Agriculture, and be under its general control. Keeping in view, therefore, the functions of the departmental experts and instructors, and the special duties which the district agent will be expected to perform, the type of officer required for the position of district agent will be one who has capacity for organisation and leadership, who has secretarial and business ability, who has had practical agricultural experience, and who knows local conditions.

The Future of the Queensland Producers' Association.

In regard to the future of the Queensland Producers' Association, American experience suggests—

- (1) That the HOME RULE policy of the Association should be preserved zealously;
- (2) That the Council of Agriculture should construct a definite programme for each section of the industry, and work consistently for the realisation of that programme, subject to such variations as developments from day to day require. The projects should consist of big essentials and not minor details, and the general aim should be to strengthen and assist existing co-operative agencies and not to absorb them. Similarly, the projects of the district councils and the local producers' associations should be planned at the beginning of each year, and these projects should deal generally with the requirements of the district as a whole, and specifically with the area covered by a L.P.A. or by a group of L.P.A.'s. Each district council should also assist the Council of Agriculture in the construction of its programme.

State Encouragement of Agriculture.

In regard to the activities of the State for the encouragement and organisation of agriculture, American methods suggest—

- (1) That the State appropriation for agricultural purposes in Queensland should be as nearly as possible commensurate with the importance of primary industries to national existence, and keeping especially in view the adequate staffing of the Department of Agriculture and Stock.
- (2) That adequate provision should be made for the agricultural training of future agricultural experts, including teaching staffs, field officers, and agriculturists, by an extension of agricultural education in the Rural Schools, and by the establishment of a College of Agriculture in the University.
- (3) That there should be complete co-operation on the part of official experts and instructors with the Council of Agriculture, District Councils, and Local Producers' Associations.

The next Article of this Series, on Packing, Grading, and Marketing, will appear in the April Journal.

TOWNSVILLE STOCK EXPERIMENT STATION.

A YEAR'S REVIEW.

By JOHN LEGG, B.Sc., B.V.Sc., M.R.C.V.S., Director.

The subjoined review is an abstract from the Annual Report of the Under Secretary for Agriculture and Stock (Mr. Ernest G. E. Scriven) to the Minister for submission to Parliament.

Several visits have been paid into country districts in connection with reported outbreaks of disease among stock. One long trip was again paid to the Gilbert River this year with the Government Botanist, but, although it was hoped that some valuable evidence would be obtained in connection with the disease known as the Gilbert River horse disease, only two cases of the disease were seen, and both of these were probably atypical.

Immunisation of Cattle Against Tick Feve

The stud cattle received for inoculation for the year ending 30th June, 1922, consisted of 72 bulls and 7 heifers.

The method of inoculation was that usually practised and needs little comment—the blood being used soon after being drawn from a recovered animal, usually in doses of 5cc., but occasionally larger. Where larger doses have been used, no material difference has been noted in the type of reaction produced. This, of course, is what would be expected, as the type of reaction does not depend on the size of the dose, but upon the susceptibility of the animal inoculated, and, perhaps, to some extent, on the particular strain of organism used. It is worth noting here in this connection that all the deaths that have occurred from redwater in the Townsville Experiment Station in the last two years have followed the use of blood from one particular animal, and it has been noticed on several occasions that blood from this particular animal tends to produce a type of reaction severer than that of several other animals used.

Testing of Bleeders.—It is necessary to test fresh recovered animals occasionally in order to ascertain whether they can be used as bleeders, because it is found that at times the blood of some animals is not capable of setting up reactions in susceptible cattle. Blood from animals from tick-infested country, and themselves being infested with ticks, has been repeatedly tested by the writer and found to be incapable of producing a reaction in susceptible cattle.

Unfortunately, there is no other method of testing blood than by inoculation in susceptible cattle, and the supply of these latter is not always available.

Claim has been made that by a special method of staining piroplasms could be detected in the blood of recovered animals (Pound; Annual Report, Department Agriculture, Queensland, 1919-20), but, unfortunately, in the report referred to no details of the special method are given. As, however, the inability to detect piroplasms in the blood of recovered animals under ordinary circumstances is not due to our inability to stain them (for there are some very excellent stains used in the detection of protozoa in the blood, such as the Leishmann, Giemsa, and Jenner methods), but to their comparative rarity in the blood, it is not likely that such a claim will be substantiated.

At the present moment the only method of testing blood is the one indicated.

Mortality at Experiment Station.—During the two years ended 30th June, 1922, 278 head of cattle have been received at the Townsville Experimental Station for inoculation purposes. Particulars of the deaths that have occurred are as follows:—

Animal.	Date of Death.	Cause of Death.
Bull ..	12 July, 1921	Septicæmia, abscess formation
Bull ..	17 June, 1921	Arsenic poisoning after dipping
Bull ..	25 May, 1921	Abscess hock
	(destroyed)	
Bull ..	4 August, 1921	Tick fever
Bull ..	5 August, 1921	Tick fever
Bull ..	2 September, 1921	Gastric tympany
Bull ..	7 December, 1921	Tick fever
Bull ..	7 December, 1921	Tick fever
Bull ..	10 January, 1922	Tick fever and abscesses
	(destroyed)	
Bull ..	10 June, 1922	Tick fever
Total deaths, 10. Percentage, 3·6 per cent.		
Deaths from Tick Fever, 6. Percentage, 2·16 per cent.		

It will be noted in the above table that two deaths from redwater occurred on 7th December, 1921, and one bull was destroyed on 10th January, 1922. These were three animals from a lot of twelve bulls which had been inoculated at the end of November, 1921. Unfortunately, commencing about ten days after the inoculation, and when the animals were at the height of their reactions, a few days of very hot weather were experienced. The whole twelve animals were very much distressed, two dying and one other becoming very much weakened, and finally developing abscesses in the knees and elbows where the skin had been bruised, thus necessitating its destruction on the 10th January following. It is believed that, although the mortality from redwater has been comparatively low during the last two years, had cooler weather been experienced when this particular lot of animals was inoculated, the mortality would have been lower still.

Loss of Virulency in Redwater Blood after being drawn.—In my last annual report I drew attention to the possibility of blood losing its infectivity soon after being drawn from an animal used for bleeding purposes. The question is of great importance, for the reasons mentioned in the report referred to. No experiments have recently been performed in this connection at Townsville, owing to there being no susceptible cattle available for inoculation purposes; but towards the middle of last year three samples of blood were received at Townsville from the Yeerongpilly Experimental Station for inoculation purposes, and the manner in which this blood was used constituted an ideal experiment. It is presumed, of course, that these samples of blood would all have been drawn from bleeders which had been tested before, although the writer is not certain on this point. It was not anticipated that this blood would prove avirulent, but it did so, and, although the samples were tested on several head of susceptible cattle, in *not one instance was a reaction produced*, and each and every one of the cattle so inoculated proved subsequently to be susceptible to the disease.

The following is extracted from a report forwarded to the Chief Inspector of Stock, dated 10th August, 1921. The samples of blood received are marked Y1, Y2, and Y3 respectively:—

Sample Y1. Received 23/5/21. Approximate age 96 hours.

Sample Y2. Received 7/6/21. Approximate age 96 hours.

Sample Y3. Received 15/6/21. Approximate age 120 hours.

The three samples have been named Y1, Y2, and Y3, and will be referred to as such throughout. In each case the inoculation was made behind the near shoulder with a 5 cc. sterile hypodermic syringe as soon as the bottle was opened, and with the usual antiseptic precautions.

Bull No. 28.—Two-year-old Shorthorn. Imported from New South Wales:—

23/5/21. Inoculated 10 cc. blood, sample Y1.

24/5/21. Temperature rose to 105.6.

25/5/21. Temperature 105.4.

26/5/21. Temperature normal.

7/6/21. Inoculated 5 cc. blood, sample Y2. Night of 7th temperature rose to 104.8. Fell to normal next morning.

14/6/21. Bull turned into yard at owner's request.

Blood smears taken 23/5/21 to 14/6/21 were all negative.

Temperature and smears were not continued long enough to ascertain whether the animal had reacted after the second inoculation, but the bull showed no signs of illness.

12/7/21: Inoculated 5 cc. blood from one of our own bleeders "B."
Temperature fluctuated from 12/7/21 to 24/7/21 between 101.5 and 103.

Smears over these dates were negative.

25/7/21. Temperature 102.8. Blood smears showed numerous piroplasma bigeminum.

26/7/21 (morning). Temperature 106.6. Blood smears showed fully 25 p.c. of red blood corpuscles invaded by the piroplasms.

(Midnight). Temperature 107.6. Animal prostrate, urine coffee-coloured. Laboured breathing. Gave 1 gram trypan blue in 100 cc. water.

27/7/21. Temperature 101.5. Smears showed very few parasites.

28/7/21. Temperature 101.5. Smears negative.

From this date on the animal made an uneventful recovery, its blood showing the usual lesions seen in piroplasmosis, poikilocytosis, polychromatophilia, granular basophilia, &c.

Bull No. 29.—Two-year-old Shorthorn. Imported from New South Wales. The history of this bull was exactly that of 28, being inoculated on same dates with same amounts of blood, turned out on the 14/7/21 at owner's request.

Its immunity was tested in the same manner on 12/7/21 by using 5 cc. blood of bleeder "B."

- 12/7/21. Inoculated with 5 cc. blood bleeder "B."
- 19/7/21. Temperature 103.2. Smears showed few piroplasms.
- 20/7/21. Temperature 103. Smears showed few piroplasms.
- 21/7/21. Temperature 104.6. Piroplasms scarce in blood.
- 22/7/21. Temperature 106.4. Piroplasms very numerous.
- 23/7/21. Temperature 101.6. Piroplasms very numerous.

Smears were continued until 27/7/21, when they were still positive, but as the animal's temperature had subsided it was turned out of the stalls.

Bull No. 37.—Two-year-old Devon. Imported from New South Wales:—

- 7/6/21. Inoculated 5 cc. blood sample Y2. Bull turned into yard on the 10th and kept under observation. It never showed any signs of illness and was got ready for show purposes. Owner then decided not to show the animal and it was tested as follows:—
- 13/7/21. Inoculated 5 cc. blood from bleeder "B."
- 19/7/21. Temperature 103.1. Piroplasms bigeminum numerous in blood.
- 20/7/21. Temperature 104.4. Piroplasms bigeminum very numerous.
- 21/7/21. Temperature 104.8. Piroplasms bigeminum very numerous.

Organisms were present in the blood for the next four days, when they gradually disappeared, the temperature at the same time falling gradually to normal. The blood showed the usual pathological changes seen in piroplasmosis, these gradually disappearing also, the animal making an uneventful recovery.

Bulls 67-76.—Ten young Shorthorn bulls, each inoculated with 5 cc. blood sample Y3 on 20/6/21. The animals were all treated the same way, hence are grouped together. As there were ten animals, the test of this blood can be considered as fairly exhaustive. Temperatures and smears were commenced on the 25/6/21 and continued until the middle of July. In no case did organisms appear in the blood of any of these animals, but the temperatures fluctuated somewhat. Many of the animals were, however, suffering from acute ophthalmia, which possibly influenced the temperatures.

Bulls 175-179.—Five young Shorthorn bulls inoculated with 5 cc. blood sample Y3 on 6/7/21. Temperatures and smears, taken between 16/7/21 and 19/7/21 inclusive, showed slight fluctuations in temperature, whilst smears were negative.

All these fifteen animals were then inoculated with the blood of bleeder "D," one of our own bleeders, but although blood examinations were continued they were negative in every case, and the temperatures showed no redwater reactions. This result was unexpected, because bleeder "D" had been tested on five consecutive bulls in June, and had given good reactions in each case. It was thought that the fifteen animals were immune as a result of the inoculation with blood on the 6/7/21 and our examination of the blood had been defective, inasmuch as we had been unable to detect organisms, although in all other cases previously we had no trouble in finding the piroplasm bigeminum, even though scanty.

It was then decided to again test the animals with the blood of bleeder "B," an animal which had never failed to produce a reaction in susceptible animals for a month previously. The inoculation was carried out on 19/7/21, a dose being 5 cc. in each case.

It is unnecessary to give the details of each of these fifteen cases, but in every one of the fifteen animals piroplasms appeared in the blood during the following fortnight, and remained in the blood for from one to six days. Several of the animals became very sick and passed red urine, and one, No. 70, died on the 5th August of redwater. This animal had shown a continuous high temperature from the eighth day after inoculation, with numerous organisms in its blood.

Conclusions.—

1. The blood sample Y1 when tested on susceptible bulls 28 and 29 produced no reaction and gave the animals no immunity to redwater.
2. That blood sample Y2 when tested on susceptible bulls 28, 29, and 37 produced no reaction and gave no immunity. Each of the above three animals passed through a typical redwater reaction some weeks subsequent to the above inoculations when inoculated with blood from bleeder "B."
3. That blood sample Y3 produced no reaction and conferred no immunity on bulls 67-76 and 175-179, each of these animals subsequently passing through a typical redwater reaction some weeks subsequent to the above inoculations when tested with blood from bleeder "B."

These experiments should be continued further, and we hope to be able to test this question in the near future by using blood from our own animals.

Analytical Branch.

The work of the analytical chemist is contained in Appendix 1 attached to this report. It is noted that many dip-owners are not sending in samples as required by the Act, and in view of the fact that so many samples are below the standard strength it is suggested that an example be made of one or two of the worst offenders and a prosecution instituted.

The registration of dips is kept well up by some stock inspectors each year. Other districts are very much behind. It is quite evident that the administration of this portion of the Act, at least, is largely a question of the personal element.

Tetanus.

This disease seems to be particularly rife in the small towns of the North. In many cases it runs a very acute course once symptoms have set in. It is believed that the organism does not vary very much in its virulency, and the acute course of the disease can only be put down to the individual susceptibility of the animal concerned.

Antitetanic sera have been used in many cases, but their value is very doubtful. It is intended to test the value of subcutaneous injections of magnesium sulphate solution in the near future, if possible.

Mastitis in Cattle.

This appears to be a fairly common disease, and affects many milking cows along the coast. The disease usually runs a benign course and is of a chronic nature. Frequently it does not show very much tendency to spread from one quarter to another, although it is commonly seen in several cattle belonging to the one herd and is apparently of a contagious nature. Owing to the present cheapness of cattle, it is advisable to turn any affected cattle into beef, and not attempt curative measures.

Vaccines are produced by commercial firms for the treatment of this condition, and also many so-called specifics for udder injection, but the value of these is very doubtful.

Gilbert River Horse Disease.

A visit was paid to the Gilbert River early in the year in order to study the symptoms of this disease, to make post-mortems, and to obtain pathological material if possible, and, with the Government Botanist, to make a survey of the plants of the area, as it has been long suspected that the disease has been of the nature of a plant poison.

The visit was very disappointing in many ways. It was expected that a considerable number of cases would occur during the wet season, as there were considerable rain and floods during the six weeks we remained on the river, yet only two cases of the disease occurred, and both these were probably atypical.

The post-mortem in these two cases showed two marked features—i.e., very great distension and engorgement of the stomach with foodstuffs, and, microscopically, a peculiar mottled greenish condition of the liver, which on microscopic examination proved to be a condition of necrosis. It is believed that the condition of necrosis of the liver is the primary lesion in the disease and is sufficient to account for the symptoms, but a study of only two cases is not sufficient to allow of conclusions being drawn.

If this condition is found in all cases, it will bring the disease into line with the disease known as "Staggers" in South Africa and also another disease known as "Dunzielt" in the same country, both diseases being due to liver necrosis and both suspected as being due to plant poisoning.

No plants were found which might be likely to cause the condition, but there are several which it would be better to test. Included among these are some specimens of the genera *Crotalaria* and *Indigofera*.

Further study in connection with this disease should first be made by ascertaining whether this condition of hepatitis (and necrosis) occurs in all cases. At present it appears to be the significant lesion in the disease, but only further study will reveal as to whether it is invariable or not.

Blackleg.

Several reports of the previous Government Veterinary Surgeons in the North have indicated that this disease occurs periodically about the Don River in the Bower District.

It is believed that many crude methods of vaccination are being used in connection with this disease, such as the inoculation of garlic and turpentine into the skin of the brisket.

Lantana Poisoning in Cattle.

This condition was fairly common during the last wet season, particularly in the Cairns District. As usual, it was commonly found among cattle brought down from the Tableland country by the butchers for killing purposes, these cattle, when being turned into paddocks along the coast, taking at once to the lantana. Cattle seem to have a much greater liking for the young shoots than for the older plants.

Septic Infection of the Feet of Imported Sheep.

During the cooler months of the year a large number of flock rams are imported from New South Wales into Queensland, and many of these pass through Townsville.

One consignment of about 200 was received in Townsville in April last, and many of these animals were suffering from injuries to the feet. The ten days that the sheep were on the boat were very wet ones, and the sheep were in all probability standing in water on iron decks a considerable portion of the time. A cracking of the skin between the toes of a good many was produced, probably owing to the animals slipping and sliding on the deck, and through these injuries infection had crept in. Small abscesses formed in between the toes and around the coronet, and there discharged a greenish-blue pus, and was probably due to the bacillus pyocyaneus. The animals became very distressed and were unable to shift about and obtain feed for themselves. The exact percentage of deaths is not known, but the mortality was very high.

Ankylostoma Duodenale in Pigs.

The discovery of this parasite, the common hookworm of man, in the pig in North Queensland is largely due to the initiative and energy of an officer of this Department (J. A. Rheuben, Slaughtering Inspector, Townsville). Particular credit is due in this instance to this officer, because several attempts had previously been made by those interested to ascertain whether this parasite occurred in the pig or not. All previous investigations have been negative in their results.

The following is extracted from the "Medical Journal of Australia," dated 5th November, 1921, under the heading "Notes on the finding of *Ankylostoma duodenale* in the Intestines of the Pig," by John Legg and J. A. Rheuben:—

O'Connor reported in the "Medical Journal of Australia" for 2nd October, 1920, the finding of *Ankylostoma duodenale* in the intestine of the pig in Funafuti, Ellice Island. Following on this, Maplestone reported in the "Medical Journal of Australia," on the examination of 182 pigs from the Townsville district of Queensland, with negative results in each case.

So far as the writers are aware, no case has been reported of the occurrence of *Ankylostoma duodenale* in the intestine of the pig in Australia.

During July last a small number of pigs from Cromarty, a small railway siding about 20 miles from Townsville, was killed, and in accordance with the usual practice, the intestines were examined by one of us (J.A.R.) for parasites.

In three of the animals nematodes closely resembling *Ankylostoma duodenale* (man) were found attached to the mucous membrane of the duodenum; they were identified as such by Dr. G. Sweet, of the Melbourne University.

The pigs in question were semi-domesticated.

The discovery of the *Ankylostoma duodenale* in pigs in North Queensland would seem to us to be of importance, and to suggest the carrying out of experiments to ascertain with what facility pigs can be infected from human sources.

Paralysis in Dogs Due to the Bite of Scrub Ticks.

Paralysis in dogs seems to be fairly common in places along the coast in North Queensland. It was always believed that this was due to the bite of scrub ticks, but this had never been tested. A recent report of Dodd in the "Journal of Comparative Pathology and Therapeutics," Part 4, 1921, contains details of certain experiments which he has performed in this connection, which would seem to indicate that there is little doubt that this condition is caused by the bite of the scrub tick. The condition is more common in young than in old dogs. Dodd suggests that this is probably due to a greater susceptibility of the young animals.

JOHN LEGG,
B.Sc., B.V.Sc., M.R.C.V.S.

APPENDIX.

The analytical work performed during the year was principally in connection with dipping fluids, of which 538 samples were submitted, with the following result:—

·6 per cent. (last year 1·4 per cent.)	contained up to 2 lb.	Arsenic Acid per 400 gallons.
3·6 per cent. (last year ·9 per cent.)	contained from 2 to 4 lb.	
15·8 per cent. (last year 15·6 per cent.)	contained from 4 to 6 lb.	
16·5 per cent. (last year 16·6 per cent.)	contained from 6 to 7 lb.	
19·3 per cent. (last year 21·1 per cent.)	contained from 7 to 8 lb.	
23·8 per cent. (last year 20·3 per cent.)	contained from 8 to 9 lb.	
10·7 per cent. (last year 11·1 per cent.)	contained from 9 to 10 lb.	
9·7 per cent. (last year 13·0 per cent.)	contained 10 lb. and over	

of which—

81·5 per cent. (last year 80·3 per cent.)	were free from oxidation	Arsenic Acid per 400 gallons.
1·2 per cent. (last year 4·9 per cent.)	contained from 0 to ·5 lb.	
1·6 per cent. (last year 1·3 per cent.)	contained from ·5 to 1 lb.	
4·3 per cent. (last year 4·1 per cent.)	contained from 1 to 2 lb.	
4·2 per cent. (last year 3·4 per cent.)	contained from 2 to 3 lb.	
7·2 per cent. (last year 6·0 per cent.)	contained 3 lb. and over	

In addition there were also analysed:—

Dipping concentrates	..	..	..	..	5
Samples from departmental dip and spray	..	..	..	..	18
Waters (partial)	..	..	..	..	4
Arsenic	..	..	..	..	5
Viscera and stomach contents	..	..	..	..	23
Miscellaneous	..	..	..	..	6

whilst 19 pints of standard iodine were prepared and despatched, 10 pints being for the use of inspectors.

Dipping Fluids.

The number of samples submitted this year (538) shows a marked increase over the total (378) for last year, but the position in this regard is still very disappointing, as can be seen from the following table:—

Year.					Number Registered.	Number Submitted.
1919-1920	..	..	..	..	668	539
1920-1921	..	..	..	..	456	378
1921-1922	..	..	..	..	606	538

Perhaps if a few prosecutions in several stock districts were made, under Regulations 29, 1, and 6 (analysis), and 30 (registrations) of the Diseases in Stock Act, owners might be made to realise that the Act just quoted is a very important and live one.

Although the number of registrations this year seem to be well forward (90 per cent. approximate), still a good number have only just come to hand, whereas they should be registered by 31st January.

Again, it should also be enforced that correct information be forwarded with each sample, and no analysis be carried out unless the form of questions (4th Schedule) accompanies such sample.

Viscera and Stomach Contents.

Of the twenty-three samples examined, the cause of death was ascertained in fifteen cases; the high percentage of positive results being accounted for by several samples from the same source being tested separately at different periods.

PURE SEEDS AND STOCK FOODS ACTS.

A YEAR'S ADMINISTRATION.

BY F. F. COLEMAN, Officer in Charge, Seeds, Fertilisers, and Stock Foods
Investigation Branch.

The following administrative review is taken from the Annual Report of the Under Secretary for Agriculture and Stock (Mr. Ernest G. E. Scriven) to the Minister (Hon. W. N. Gillies) for presentation to Parliament:—

The operations of the Stock Foods Act have brought this branch into more constant touch with manufacturers, produce merchants, and general storekeepers, and the business has greatly increased.

The constant stream of callers has taken up a large amount of time, and many complex problems meriting immediate research have resulted, but, unfortunately, little can be done in this direction, owing to the increasing demands made on the staff by general work and the investigation of the many complaints received, all of which have been carefully considered, and forty-eight complaints as to the quality of agricultural seeds or stock foods investigated. This has necessitated the visiting of the under-mentioned districts:—Allora, Atherton, Babinda, Brisbane, Bowen, Cairns, Clifton, Caboolture, Eumundi, Forest Hill, Gympie, Gayndah, Gordonvale, Killarney, Kingaroy, Landsborough, Mackay, Maryborough, Malanda, Murgon, Myola, Nambour, Nanango, Pomona, Pearamon, Rockhampton, Rosewood, Stanthorpe, Townsville, Toowoomba, Warwick, Woodford, Yangan, and Yungaburra.

Definition of Vendor.

A vendor under the Pure Seeds Acts is "any person who sells, or offers or exposes for sale, or contracts or agrees to sell, any seeds." It will therefore be noted that the common acceptance of the Acts as referring only to seedsmen is erroneous.

Large quantities of seeds are sold as seed for sowing by farmers, storekeepers, and produce merchants, most of whom are without any seed-cleaning machinery, or any desire to obtain even a set of suitable sieves or the cheapest of cleaning machines.

Purity Analyses.

Table I. gives the germinating capacity of the principal agricultural seeds, with the standards of germination prescribed by the regulations under the Acts. Table II. gives the purity analyses of the same, which are, with the exception of rye, tares, oats, and a few samples of lucerne, the produce of Queensland. Owing to the large quantities

of ungraded seeds held by produce merchants and frequently stored by them on behalf of the grower, it has been found necessary to alter the methods of examination and make complete purity analyses as well as germination tests of all samples sent in for examination by vendors or obtained by an officer under the Acts. This has more than doubled the work, but it is now possible to identify a particular sample by keeping a careful record of its various characteristics.

Section 6 of the regulations permits of the sale by farmers of "as grown" seeds, providing such seeds are sold to seed merchants for cleaning or grading. Unfortunately, a definition of a seed merchant is not given in the regulations; it is, however, generally understood that a seed merchant refers to any vendor in a position to clean and handle seeds in large quantities; in other words, a seed merchant is any vendor with one or more efficient seed-cleaning machines and the will to put them to daily use.

Amending Legislation Suggested.

Consideration might well be given to such amending legislation as will provide for the registration of seed merchants, as defined by the preceding paragraph, to whom section 6 of the regulations applies, also to the compulsory labelling of all agricultural seeds. Such labelling is in operation in other countries, the label attached to each package giving the following particulars:—

Kind of seed:
Where grown:
Purity, per cent.:
Inert matter, per cent.:
Weed seeds, per cent.:
Germination, per cent.:
Date of test:
Name and address of vendor:

Under the Pure Seeds Acts the seller must give to the buyer an invoice stating that the seeds are for planting or sowing, and that they contain no greater proportion or amount of foreign ingredients than is prescribed. Vendors, however, frequently give an invoice without first ascertaining the purity or germination of the seed. No one can honestly give any such document without an analysis of a sample drawn from the actual bulk in the seller's possession. Even such articles as oats, barley, &c., of which both buyers and sellers may be able to judge the market price, require a purity analysis and germination test.

Imported Seeds.

Table III. gives the purity and germination of the principal imported seeds, with the countries from which they were shipped. It does not always follow that the port of shipment is in the country of origin. From the table it will be observed that the purity and germination is, on the whole, satisfactory.

It is proposed to make a similar Table for vegetable seeds sold by the various vendors in small packets. Many complaints were received as to the poor germination of vegetable seeds purchased by market gardeners, several samples of cabbage growing less than 20 per cent., carrots less than 29 per cent., and cucumbers less than 20 per cent. The vendors of such seeds would therefore be well advised to destroy their old stocks and rely on the freshly imported seeds referred to in Table III.

In addition to the vegetable seeds above mentioned, 177 consignments were imported by parcels post. These contained hundreds of small commercial quantities, the quality of which were not up to the bulk seeds, and many small lots imported by private persons contained weed seeds. All such packages when large enough were re-cleaned in quarantine.

Misuse of Certificates.

Attention has been directed to the misuse of certificates relating to samples sent in by vendors, which certificates are not a guarantee by the Department as to the quality of the bulk that the sample is supposed to represent, but a plain statement of facts revealed by a purity analysis and germination test of the sample received. Both buyers and sellers are encouraged to send in samples for analysis, the report in most cases being in the form of a certificate, for which a fee of 2s. 6d. is charged. It is of the utmost importance that the samples be drawn from the actual seed in the sender's possession and that they be truly representative of the bulk. Instructions as to sampling, &c., have been issued in leaflet form; nevertheless, every month brings many samples of both seeds and stock foods without the name or address of sender. Over 200 of such samples came in during the last six months. Nearly as many were too small for any determination to be made. Unless proper care is exercised by senders, delays in the issue of reports will continually occur.

TABLE I.
GERMINATING CAPACITY OF AGRICULTURAL SEEDS, 1921-1922.

PERCENTAGE OF SAMPLES GERMINATING BETWEEN—												Standards of Germination prescribed by the Pure Seeds Acts.	
	100-00	89-80	79-70	69-60	59-50	49-40	39-30	29-20	19-10	9-0	A Grade.	B Grade.	
Barley, Cape	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	
Barley, Skinless	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	
Canary	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	
Cowpea*	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	
Lucerne*	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	
Millet, Foxtail (Setaria)	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	
Millet, Japanese	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	
Oats	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	
Panicum, White	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	
Paspalum	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	
Prairie Grass	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	
Rhodes Grass	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	
Rye	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	
Sorghum	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	
Sudan Grass	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	
Tares	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	
Beans, Canadian Wonder	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	
Peas	100-0	99-0	98-0	97-0	96-0	95-0	94-0	93-0	92-0	91-0	90-0	89-0	

* Lucerne and Black Cowpea Seeds of Queensland growth frequently contain a large amount of Hard Seeds, which are seeds with seed coats so impervious to water as to delay germination. The figures appearing below give the average plus amount in the samples germinating between the percentages at the top of the column. When the amount of Hard Seeds present in any sample exceeds 10 per cent, it is obvious that the effective germination is greatly reduced.

Percentage of hard seeds in Lucerne	100-90	89-80	79-70	69-60	59-50	49-40	39-30	29-20	19-10	9-0
Percentage of hard seeds in Black Cowpea	100-90	89-80	79-70	69-60	59-50	49-40	39-30	29-20	19-10	9-0

* Lucerne and Black Cowpea Seeds of Queensland growth frequently contain a large amount of Hard Seeds, which are seeds with seed coats so impervious to water as to delay germination. The figures appearing below give the average plus amount in the samples germinating between the percentages at the top of the column. When the amount of Hard Seeds present in any sample exceeds 10 per cent., it is obvious that the effective germination is greatly reduced.

TABLE II.
PURITY ANALYSES OF AGRICULTURAL SEEDS, 1921-1922.

MATTER AND WEED SEEDS.																		
PERCENTAGE OF SAMPLES CONTAINING NOT MORE THAN 1 PER CENT. TO NOT MORE THAN 70 PER CENT. OF INERT																		
	1	2	3	4	5	10	20	30	40	50	60	70	Principal Weed Seeds in their order of occurrence.*					
	%	%	%	%	%	%	%	%	%	%	%	%	1	47	48	30	34	2
Barley, Cape	30.7	..	69.3	..	..	..	..	..	..	..	..	..	48	58	47	27	39	..
Barley, Skinless	..	..	46.2	..	30.8	23.0	..	..	..	..	..	..	27	19	45	30	41	7
Canary	..	..	22.3	..	22.3	55.4	..	..	..	..	..	..	35	49	..	..	..	..
Cowpea	37.9	13.8	20.7	3.5	6.9	10.3	6.9	..	..	..	..	..	11	42	45	3	50	34
Lucerne	12.5	12.5	45.9	6.3	6.2	8.3	8.3	..	..	..	..	..	28	12	36	3	19	50
Millet, Foxtail	14.8	3.7	48.2	3.7	25.9	3.7	..	..	..	..	..	..	..	..	..	..	..	..
(Setaria)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Millet, Japanese	18.4	16.3	38.8	10.2	12.2	2.1	..	2.0	..	..	..	..	39	3	41	45	19	58
Oats	8.0	12.0	34.0	8.0	18.0	16.0	4.0	..	..	..	..	..	1	30	8	34	45	19
Panicum, White	20.0	8.0	56.0	..	8.0	8.0	..	..	..	..	..	..	39	22	50	61	49	11
Paspalum	20.3	18.6	37.3	5.1	13.6	3.4	1.7	..	..	..	..	..	39	22	45	23	61	49
Prairie Grass	12.5	8.4	29.1	4.2	29.1	4.2	4.2	8.3	..	..	..	..	1	47	2	37	31	32
Rhodes Grass	3.7	14.6	22.7	13.2	14.2	17.9	10.0	0.5	..	1.1	1.6	0.5	13	24	39	59	11	60
Rye	20.0	..	80.0	..	..	..	..	..	..	..	..	..	8	1	62	..	..	..
Sorghum	25.0	..	45.0	5.0	15.0	10.0	cont	ained	inert	..	..	..	..	..	..	..	..	..
Sudan Grass	5.5	8.3	57.0	5.6	12.5	9.7	1.4	..	..	..	..	..	39	19	28	3	11	16
Tares	50.0	..	..	..	50.0	..	..	..	..	..	..	..	7	33	45	11	..	..
Beans	64.7	..	29.4	5.9	cont	ained	inert	matter	..	..	..	..	..	..	..	..	..	..
(Canadian Wonder)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Peas	55.0	5.0	40.0	cont	ained	inert	matter	..	..	..	..	..	..	..	..	..	..	..

The Standard of Purity prescribed for A Grade Seeds is not more than 2 per cent. of inert matter, not more than 1 per cent. Weed seeds. For B Grade Seeds not more than 3 per cent. of inert matter, not more than 2 per cent. Weed seeds. These standards apply to all seeds herein mentioned, except Barley, Oats, and Rye, the standards for which are—A Grade not more than 1 per cent. of Inert Matter, 1 per cent. Weed Seeds, and 1 per cent. of any cultivated cereal other than the kind to which the sample belongs. Seeds less in diameter than one-fourteenth of an inch none. The Standard for B Grade gives a greater latitude.

* See note next page.

*WEED SEEDS OF FREQUENT OCCURRENCE.

- 1 *Avena fatua*, Wild Oat.
- c2 *Apium*, sp.
- 3 *Amarantus* sp.
- 4 *Aristida* sp., Spear Grass.
- 5 *Andropogon* sp.
- a6 *Anagallis arvensis*, Common Pimpernel.
- c7 *Brassica* sp.
- 8 *Bromus maximus*, Great Brome.
- 9 *Bromus mollis*, Soft Brome Grass.
- 10 *Bidens pilosa*, Cobbler's Pegs.
- c11 *Chenopodium* sp.
- c12 *Centaurea Melitensis*, Star Thistle.
- 13 *Chloris divaricata*.
- 14 *Chloris barbata*.
- 15 *Chloris truncata*.
- 16 *Cnicus lanceolatus*, The Common Thistle.
- 17 *Cuscuta* sp., Dodder.
- 18 *Caucalis* sp.
- a19 *Datura stramonium*, Thorn Apple.
- 20 *Diplachne parviflora*.
- c21 *Daucus brachiatus*.
- 22 *Eleusine indica*, Crow's Foot.
- 23 *Eriochloa punctata*, Early Spring Grass.
- 24 *Erigeron linifolius*.
- 25 *Eragrostis* sp.
- 26 *Festuca* sp., Fescue.
- c27 *Geranium dissectum*, Cut-leaved Geranium.
- 28 *Hibiscus trionum*, Bladder Ketmia.
- c29 *Hypochaeris*, sp., Cat's Ear.
- b30 *Lolium temulentum*, Darnel.
- c31 *Lepidium ruderales*, Waste-places Cress.
- 32 *Lithospermum arvense*, Corn Gromwell.
- c33 *Lepidium campestre*, Pepper Grass.
- c34 *Melilotus parviflora*, Hexham Scent.
- 35 *Malvastrum tricuspidatum*, False Mallow.
- c36 *Marrubium vulgare*, White Horehound.
- 37 *Malva parviflora*, Small-flowered Mallow.
- c38 *Medicago denticulata*, Medic Burr.
- 39 *Panicum sanguinale*, Summer Grass.
- 40 *Panicum decompositum*, Barley Grass.
- 41 *Polygonum convolvulus*, Climbing Buckwheat.
- 42 *Polygonum aviculare*, Wireweed.
- 43 *Plantago lanceolata*, Rib Grass.
- 44 *Portulaca oleracea*, Pig Weed.
- 45 *Rumex* sp., Dock.
- c46 *Raphanus Raphanistrum*, Wild Radish.
- 47 *Sonchus* sp., Sow Thistle.
- 48 *Silybum marianum*, Virgin Mary's Thistle.
- 49 *Sida rhombifolia*, Sida Weed.
- b50 *Stachys arvensis*, Stagger Weed.
- b51 *Solanum nigrum*, Black Nightshade.
- 52 *Salvia Verbenaca*, Wild Sage.
- 53 *Stellaria media*, Common Chickweed.
- 54 *Silene Gallica*, French Catchfly.
- c55 *Sisymbrium orientale*, Oriental Rocket.
- 56 *Spergula arvensis*, Corn Spurry.
- 57 *Stipa* sp.
- 58 *Tribulus terrestris*, Bulls Head, Caltrops.
- 59 *Tricholæna Teneriffæ*, Red Natal Grass.
- c60 *Tagetes glandulifera*, Stinking Rodger.
- 61 *Verbena* sp., Purple Top.
- 62 *Vicia* sp., Wild Tare.
- 63 *Xanthium spinosum*, Bathurst Burr.

a Poisonous.

b Suspected poisonous.

c Impart a bad flavour to butter.

TABLE. III.
GERMINATING CAPACITY AND PURITY OF THE PRINCIPAL SEEDS IMPORTED INTO QUEENSLAND DURING 1921-1922.

	Imported from—	PERCENTAGE OF SAMPLES GERMINATING BETWEEN—										Standard of Purity not more than 2 per cent. Inert Matter, 1 per cent. Weed Seeds. Percentage of Samples up to prescribed Standard.
		the Pure Seeds Acts.										
		100-99.	80-80.	79-70.	69-60.	59-50.	49-40.	39-30.	29-0.	%	%	
Beet ..	Holland, England, U.S.A.	..	8.8	38.2	35.3	11.8	5.9	..	..	55	100
Beans, Lima ..	U.S.A.	60.0	40.0	..	..	..	..	..	..	75	100
Beans, Broad ..	New Zealand, Holland	100.0	..	..	..	..	..	..	..	75	100
Beans, French ..	U.S.A., New Zealand, Holland	84.2	10.5	5.3	..	..	..	..	..	75	100
Beans, Mauritius ..	Fiji ..	100.0	..	..	..	..	..	..	..	75	100
Cabbage ..	Holland, England, U.S.A.	27.6	57.6	12.7	..	2.1	..	..	..	63	100
Cauliflower ..	Holland, Italy, England	35.7	21.5	35.7	..	7.1	..	..	..	60	100
Carrot ..	Holland, England, U.S.A.	..	17.2	13.8	34.5	20.7	6.9	6.9	..	55	100	
Cucumber ..	U.S.A., England, Italy	58.8	29.4	5.9	..	5.9	..	..	..	70	100
Leek ..	U.S.A. ..	..	..	66.7	..	..	33.3	..	..	50	100
Lettuce ..	U.S.A., Holland, England	70.8	16.7	8.4	..	4.1	..	..	..	65	99
Mangel ..	Holland, England	14.3	19.1	9.5	47.6	9.5	..	..	..	55	100
Melon ..	U.S.A.	16.7	58.4	13.9	2.8	5.5	2.7	..	..	65	100
Onion ..	New Zealand, England, France, U.S.A.	15.4	46.1	15.4	7.7	7.7	..	7.7	..	60	100	
Peas ..	Holland	100.0	..	33.4	33.3	..	..	..	..	80	100
Parsley ..	Holland, U.S.A.	..	..	..	..	..	33.3	..	..	50	100
Parsnip ..	Holland	..	..	..	..	50.0	..	50.0	..	30	100
Radish ..	Holland, England, U.S.A.	34.8	17.4	34.7	13.1	..	..	..	..	60	99
Swede ..	Holland, England	33.3	40.0	26.7	..	..	..	..	..	65	100
Sweet Corn ..	U.S.A.	28.6	57.1	14.3	..	..	..	..	..	75	100
Tomato ..	U.S.A., Italy ..	5.9	47.0	35.3	11.8	..	..	..	..	65	100
Turnip ..	Holland, England, U.S.A.	65.4	26.9	..	..	7.7	..	..	..	65	100
Tobacco ..	U.S.A.	..	..	50.0	..	50.0	..	..	..	50	100
Hemp ..	Japan ..	..	..	..	..	..	..	..	..	..	..
Linseed ..	New Zealand, Japan	..	..	..	..	..	..	..	..	..	..
Millet, Red French	Japan ..	..	..	..	..	..	..	..	..	..	..
Millet, White French	Japan ..	..	..	..	..	..	..	..	..	..	..
Rape ..	Japan ..	..	..	..	..	..	..	..	..	..	..

Imported for feeding purposes—Purity ranging from 95 to 98 per cent.

Imported for feeding purposes—Purity ranging from 95 to 98 per cent.

THE STOCK FOODS ACT.

Under section 3 of the Act every wholesale seller of such foods as bran, pollard, calf meal, poultry meal, or other mixed, concentrated, or prepared stock foods is required to send in each year, before the 31st of January, a sample, statutory declaration, specimen invoice, and label which is to be affixed to every package. To explain the requirements of the Act, circulars were mailed last December to every known wholesale seller within the State.

Samples of bran and pollard were taken from the various vendors or delivered in accordance with section 3 of the Act, a portion of each sample being sent to the Agricultural Chemist for chemical analysis.

For purposes of comparison, the following table gives the chemical analyses of the Queensland and Southern products:—

—	MANUFACTURED IN					
	QUEENSLAND.			SOUTHERN STATES.		
	Crude Protein.	Crude Fat.	Crude Fibre.	Crude Protein.	Crude Fat.	Crude Fibre.
	%	%	%	%	%	%
Bran—						
Average ..	16.2	4.2	10.0	15.0	3.0	10.4
Maximum ..	18.1	4.6	10.6	16.6	4.0	12.4
Minimum ..	14.8	3.8	9.2	14.4	2.0	8.3
Pollard—						
Average ..	16.1	3.6	5.6	14.9	3.3	7.9
Maximum ..	17.3	4.1	7.2	16.2	4.4	10.3
Minimum ..	15.4	2.6	4.3	14.3	2.7	4.5

Time has not permitted of a thorough microscopical examination of the samples. Traces, however, of *Lolium temulentum*, *Avena fatua*, *Brassica sinapis*, and other weeds were found in many of the brans, and in several instances the so-called pollards were not true pollards within the definition of the regulations. These remarks apply to both Southern and Queensland products; the latter, it will be noted from the above table, are of better average quality.

Vendor's Guarantee.

In many instances both meals and calf foods have not been up to the vendor's guarantee. In most cases the manufacturer has altered the label and reduced the figures given for protein or fat and increased that of fibre. The regulations under the Act do not prescribe a standard, but it is compulsory on the vendor to attach a label stating the minimum amount of crude protein and crude fat, with the maximum amount of crude fibre. The vendor therefore makes his own standard, and it is but reasonable to expect the vendor's goods to be up to his own guarantee.

The Farmer as a Consumer.

The farmer is not only the producer of the wheat or other grain, but the largest consumer of the various by-products; it therefore follows that he should have more than a passing interest in the quality of the foods purchased, the feeding value of which will improve as the buyers become more critical. Millers and other manufacturers are not wholly responsible for the weed-seeds and foreign matter of like nature that is found in stock foods; the root of the trouble is the farm where the grain or chaff was grown.

Exact Definitions Desired.

Several complaints were received from merchants regarding oats purchased from the Southern States. One sample contained over 11 per cent. of weed-seeds; another over 6 per cent. of weed-seeds, and nearly 5 per cent. of other foreign matter. It is to be regretted that both buyers and sellers base the so-called grades on general opinion, which is influenced by a rising or falling market. The same remarks apply to chaff; the words "prime" or "good and sound" are absolutely meaningless unless based on an exact definition. The words "reasonably free from foreign matter" do not imply any definite quality unless the amount and kinds of foreign matter are expressed on a percentage basis with the total prohibition of any substance deleterious to life or health of stock, such as *Ricinus communis* (castor-oil beans).

A Typical Instance.

A typical instance of deleterious matter occurred last August, when several trucks of chaff were found at Toowoomba, Brisbane, and Maryborough containing a large amount of *Datura stramonium* seeds. Fortunately the sales were stopped before any serious damage occurred. None of the merchants handling this line could at the time identify *Datura*, the presence of which the grower of the chaff is responsible for.

Every effort has been made to give the fullest possible information to any produce merchants or storekeepers desirous of obtaining a fuller knowledge of these impurities. The majority of vendors, however, are inclined to trust to their luck and ready wit when an officer makes an occasional visit to their store.

QUEENSLAND STOCK IN 1922.

By MAJOR A. H. CORY, M.R.C.V.S., Chief Inspector of Stock.

Abstracted from the Annual Report of the Under Secretary for Agriculture and Stock (Mr. Ernest G. E. Scriven) to the Minister (Hon. W. N. Gillies) for presentation to Parliament.

Stock Statistics.

The following figures supplied by the Government Statistician show an increase in horses, cattle, sheep, and pigs as compared with the previous year:—

Year.				Horses.	Cattle.	Sheep.	Pigs.
1921	..	..	..	742,217	6,455,667	17,404,840	104,370
1922	..	..	..	747,543	7,047,370	18,402,399	145,083
Increase ..				5,326	591,703	997,559	40,713

It is satisfactory to note the increase in the number of stock. There has been a general depression in the cattle industry owing to the low value of stock, and until oversea markets are established, there seems little likelihood of any permanent improvement. The sheep industry is in a much more satisfactory position, owing to the enhanced value of merino wools and mutton.

Horses Exported.

Eight hundred and seventy-six (876) horses were exported oversea, of which two hundred and eighty-two (282) were mares.

Examination of Stallions.

Examinations were held at the following places:—Brisbane, Laidley, Esk, Lawnton, Townsville, Beenleigh, Gympie, Nambour, Warwick, Goomeri, Kingaroy, Nanango, Dalby, Killarney, Georgetown, Gatton, Boonah, Lowood, Bundaberg, Rockhampton, Caboolture, Beaudesert, Toowoomba, Ipswich, Marburg, Mackay, Charters Towers.

Eighty (80) stallions were examined, of which number six (6) or 7.5 per cent. were rejected.

Tabulated results of the examination are as follow:—

	DRAUGHT HORSES.				BLOOD HORSES.		LIGHT HORSES.		PONIES.		TOTALS.	
	Number Examined.	Number Certified.	Number Examined.	Number Certified.	Number Examined.	Number Certified.	Number Examined.	Number Certified.	Number Examined.	Number Certified.	Number Examined.	Number Certified.
—	16	15	20	17	21	19	23	23	23	74	80	74
Defects.	1	6.25	3	15.00	2	9.52	..	..	..	7.5	6	7.5
Sidebones	1	6.25	..	..	..	..	..	..	..	1.25	1	1.25
Spavin	..	..	1	5.00	2	9.52	..	..	..	3.75	3	3.75
Curb	..	..	1	5.00	..	..	..	..	..	1.25	1	1.25
Want of type and conformation	..	..	1	5.00	..	..	..	..	..	1.25	1	1.25
Totals	1	6.25	3	15.00	2	9.52	..	..	..	7.5	6	7.5

Analytical Examinations.

Forty-nine (49) samples of viscera and contents were submitted to the Agricultural Chemist for analysis, and in twenty-two (22) cases poison was detected. In North Queensland twenty-three (23) samples were examined, of which fifteen (15) contained poison.

Interstate Conference.

A conference of the chief veterinarians and stock officials of the different States were held in Sydney in April last. The following subjects, among others, were dealt with:—

Uniformity with regard to stock and stock disease legislation.

The adoption of a uniform schedule of diseases of animals throughout the States.

That each State should undertake an educative campaign with the object of eliminating and eradicating pleuro-pneumonia contagiosa from Australia.

The diagnosis and control of swine fever and the restriction of interstate traffic in pigs.

Control of the cattle tick and the effect of cattle tick on interstate traffic.

Control of sheep louse and sheep tick.

The disposal of actinomycotic, tubercular, and cancerous cattle.

Conditions governing the export of cattle to Java and other countries.

Rabbit and vermin suppression.

Railways and their importance in suppressing the spread of animal diseases.

Certification and registration of stallions.

The passage of legislation governing the veterinary profession.

Consideration of the form of certification and notification in connection with interstate traffic in stock.

TICK BOARD.

Suppression of Tick Pest.

The activities of the Board have, during the year under review, been increasingly directed to the suppression of the tick pest in areas where sporadic outbreaks have occurred, and in the minimisation of the pest in the heavily tick-infested territory; also to the prevention of an extension of the present infested areas of the State.

It has been noted with satisfaction that stockowners generally are becoming more alive to their responsibilities, and efforts to secure their co-operation have been attended with more success than hitherto. It is obvious, however, that unless this co-operation is directed systematically, there is little hope that the objects of the Board can be fully achieved.

The local authorities throughout the State, with isolated exceptions, do not exhibit that practical sympathy which would be expected in efforts made to deal with the tick pest.

Stock Movements.

In the earlier portion of the year stock movements, especially in Northern areas, were considerably reduced owing to the fact that meatworks were not operating, but the traffic on routes converging on the Queensland Northern Railway is now very heavy.

Cattle have from time to time arrived at Julia Creek from Gulf areas in a heavily tick-infested condition, and the attention of those interested has been drawn to the necessity for dipping at the Government dip at Donor's Hills prior to further movement in a southerly direction. A subsequent dipping from seven to ten days prior to arrival at centres on the Queensland Northern Railway should also be arranged for, and if effective, this would permit stock to cross to centres south of the railway on one further dipping.

Large mobs of cattle have during the past year travelled through the Burnett areas to the Darling Downs, and dipping at Jarrah, Durah, and Boondooma, prior to entry on to the Downs, has been enforced in the interests of stockowners in the clean areas south of the Main Range. Owing to the difficulty in securing effective supervision by a permanent officer at Boondooma, the Burrandowan dip was commissioned for the cleansing of cattle travelling across the range *en route* to Jandowae and centres further south, but it may be possible to again use the Boondooma dip for that purpose when the services of an officer from the Kingaroy area can be detailed for supervisory duties.

Notwithstanding the close supervision and the application of restrictions on stock movements from tick-infested to clean country, it is regretted that an important extension of the area of infestation in Central-Western Queensland has occurred.

Tick-infested Travelling Stock.

In July, 1921, mobs of travelling stock from territory north of the Queensland Northern Railway were found tick-infested on arrival at Isisford after movement *via* Winton, Evesham, Maneroo, and Arrilalah. Immediate action was taken to ascertain, if possible, the source of infestation and to return the infested cattle on the route

travelled, and thence to Aramac for dipping. Exhaustive inquiries indicated that the cattle were clean on arrival at Winton, and as certain cattle depastured at Baratria, on the Winton-Maneroo route, were found infested, there is no doubt that these stock were responsible for the trouble. Every precaution was taken to prevent stock movements on or across the infested route until dipping facilities could be provided by stockowners or local authorities interested. The co-operation of the shire councils at Isisford and Blackall was sought and obtained to deal with spraying operations at those centres, and additional inspectors were detailed for duty at Isisford, Blackall, and Jundah. It was necessary to extend cleansing operations to Blackall in view of the fact that holdings on both sides of the Barcoo River were found infested. Stock from Northern areas for the south, travelling *via* Winton, were deviated at Evesham, *via* Camoola, to Aramac, for dipping, and were thence permitted to travel *via* Barcaldine, Jericho, and Tainbo, avoiding Blackall. Close inspections have been periodically made of the infested route, also of adjoining holdings and town reserve, but no ticks have been found for some months.

This indicates a possibility that the outbreak has been successfully coped with, but development during the ensuing summer must be awaited before this can be assumed with any degree of certainty. The restrictions, therefore, will apply, with the exception of a variation to permit fat stock for immediate slaughter, from holdings west of the Maneroo route, crossing that route direct to Longreach to the trucks.

The Board also decided recently that as there is no danger to be apprehended by the movement of stock *via* Blackall from Barcaldine, this route has now been opened, and cattle may travel through Blackall *en route* to Tambo and southern areas.

Regular dippings or spraying and inspections were carried out in centres on the Darling Downs, where sporadic outbreaks of ticks occurred during the previous year, and restrictions on movements of travelling stock in the Clifton, Pratten, Dalby, and Pittsworth areas have now been removed.

Unfortunately, in March last ticks were found on cattle at Yeulba, but as the route between the Main Range and the railway on which the infested cattle had travelled was found clean, it was not considered that infestation occurred from that source. Upon further inquiry, it was ascertained that some cows had been introduced from the Brisbane district. These cattle were dipped twice in approved dips and found free from ticks before permission was granted to truck for Yeulba, but the stock were not trucked for some twenty-four hours after dipping, as it was considered, until recent investigations proved otherwise, that dipping would prevent larval ticks from attaching themselves to animals for at least thirty-six hours after dipping. It has since been proved that larval ticks will attach themselves within eighteen hours, which probably occurred in this case. The infested cattle were periodically sprayed until clean, and all cattle on suspected holdings were mustered and crush-inspected, but were not found infested.

Isolated outbreaks also occurred at Macalister and Bowenville, but after necessary spraying restrictions had been periodically applied, and frequent inspections had revealed the fact that the infested areas were clean, quarantine restrictions imposed of the discovery of the outbreaks were removed.

Certain tick-infested cattle arrived at Jondaryan from the Boonah district in April last, but the ticks were noted immediately on arrival, and the cattle were returned to their original pastures.

The Railway Department has co-operated with the Board in respect of the disinfection of stock trucks, but until provision is made for the establishment of central depôts for that purpose it will be difficult to secure thoroughly effective results.

Helidon Cleansing Area.

The work carried out in this area has been attended with successful results. In January last a considerable portion was declared clean, and restrictions were removed. The area has been enlarged, as it was found necessary to extend the boundaries to conform with watersheds. By so doing, we now have included therein a large portion of rough, grossly tick-infested country adjoining Cressbrook Creek and the Anduramba road. The officer in charge of the area reports that infestation has been greatly reduced in these localities by frequent periodical dippings, and he anticipates that with the co-operation of stockowners, which is cheerfully extended, the majority of the infested holdings will be cleaned in the ensuing twelve months.

Holdings inspected	..	..	..	..	4,201
Horses inspected	..	..	..	..	10,165
Cattle inspected	..	..	..	..	152,327
Sheep inspected	..	..	..	..	158
Number of infested holdings	..	..	..	..	499
Number of stock dipped	..	..	..	..	46,188

South Burnett Cleansing Area.

As reported last year, the southern portion of this area, comprising about 1,280 holdings and aggregating approximately 220,000 acres, has remained clean, with the exception of sporadic outbreaks caused by the passage of certain tick-infested stock. Although precautions were taken to prevent infested stock gaining admission to the cleansing areas, it is found practically impossible at times owing to irregularities on the part of owners of travelling stock.

An officer has been stationed at Wondai for a considerable period to prevent the introduction of tick-infested stock from the northern portion of the gazetted cleansing area, and also to supervise the dipping of stock grazing on the northern boundary. It has been decided that the present southern portion of the cleansing area is a sufficient buffer to the clean country on its southern boundary; therefore, the cleansing work will not be continued in the northern portion, but operations will be extended in a westerly direction to include the parishes of Dulong and Boondooma, which will link up this area with the Miles-Chinchilla area.

Holdings inspected	..	..	..	..	..	832
Stock inspected	..	..	..	..	..	65,107
Infested holdings	..	..	..	..	..	207
Stock dipped	..	..	..	..	..	41,151

Miles-Chinchilla Area.

During the early portion of the year under review repeated applications were made for the removal of restrictions applicable to this area. After full reports had been received from the officer in charge it was decided to release the greater portion of the area from cleansing operations. However, in view of the possibility of infection due to the movement of tick-infested cattle to Chinchilla, it was decided that action for the release of the south-eastern portion of the area should be deferred until there is evidence that no danger is to be apprehended as a result thereof.

Holdings inspected	..	..	..	..	..	531
Stock inspected	..	..	..	..	..	41,150
Infested holdings	..	..	..	..	..	—
Stock dipped	..	..	..	..	..	—

South Coast Area.

Regular dipping of stock was carried out in the Coolangatta town area. It was not considered expedient at present to extend operations to the other portion of the proclaimed area, which extends to the Logan River. Straying stock on roads at Tugun were dipped as a precaution against their surreptitious entry into the Coolangatta town area. Notwithstanding the precautions taken, stock were found tick-infested in the Coolangatta area in the months of March and April last.

Dips.

The total number of dips registered in the State totals 4,163, as compared with 3,976 last year.

Particulars of dips registered in the various stock districts are as follow:—

District.	Number.
Barcaldine	3
Bowen	205
Brisbane	1,047
Cairns	202
Clermont	53
Cloncurry	40
Cooktown	39
Gladstone	323
Hughenden	34
Maryborough	1,290
Normanton	32
Rockhampton	446
Roma	43
Springsure	60
Toowoomba	93
Townsville	217
Warwick	34
Winton	2
Total	4,163

Dipping Fluids.

One thousand one hundred and fifty samples of dipping fluids were analysed, viz., 612 from Southern and Central Queensland, and 538 in North Queensland. As reported previously, the regulation providing for the compulsory analysis of dipping fluids twice annually is not enforced except in proclaimed cleansing areas or in cases where dips are recognised by the Department for the cleansing of stock prior to movement into tick-free country. In these cases it is found necessary to regulate intervals between the analyses of dip fluids to conform with the number of stock dipped or the addition of fresh concentrate. The portable testers supplied to stock inspectors have been found most useful for field tests, more particularly in isolated centres where samples could not be analysed for a considerable period. No less than 52 pints of standardised iodine solution was supplied to the various inspectors by the agricultural chemist.

DISEASES IN STOCK.

The members of the veterinary staff have made 356 visits to various centres in Southern and Central Queensland (Appendix I. deals specifically with North Queensland). The distances travelled in many cases were very great, as can be readily understood when the size of this State is considered, but much useful knowledge has been disseminated and practical aid given to numerous stockowners. The testing of cows for tuberculosis was carried out free of cost, but prior to the test the consent of owners was obtained in all cases for the destruction of animals which reacted. The health of stock generally has been good, and no outbreaks of any new infectious diseases were noted. Cases of poisoning were investigated in several districts, due in most cases to poisonous vegetation. Cases of arsenical poisoning were also investigated, and were chiefly associated with the destruction of prickly-pear. In most instances stock were not removed from the paddock while the work of destruction was in progress, with the inevitable result that the animals consumed the poisoned pear. Treatment in many cases was impracticable, as the animals were unaccustomed to being handled. With quiet cattle the administration of moist peroxide of iron has been found very successful. The only practical method of dealing with these cases is to remove stock from the paddocks where pear is being treated, or by eradication of the poisoned pear before stock are allowed to graze in the paddocks.

Mycotic Poisoning.

In a few instances mycotic poisoning came under notice, due to the growth of moulds on dry grasses, following a propitious season. The cutting of the natural grasses for conservation as hay or silage is undoubtedly a precaution against mycotic poisoning, and also serves as an asset in drought periods, although an impression has gained ground that the natural grasses are useless when conserved for fodder. If the fodder is used as hay, or cut into chaff, and is sprinkled with a mixture of molasses and water, which adds to the digestibility and palatability, it is a very wholesome and desirable article of food, on which stock do well for considerable periods. The molasses acts to a slight extent as a corrective to fungi poisoning, in that it assists a healthy and normal bowel action.

Pleuro-Pneumonia Contagiosa.

Seventy cases of this disease have been reported, as compared with sixty-six last year. The usual quarantine of three months after successful inoculation has been enforced. It was resolved at the Interstate Conference held in Sydney to reduce the quarantine period to two months.

So-called Caterpillar Plague Affecting Cattle.

Early in July information was received from the Roma District that large numbers of cattle had died and that others were sick, the result of eating so-called caterpillars.

The District Inspector of Stock, Roma, was wired to for confirmation of the news, but before receiving his reply, Mr. Armstrong (officer in charge of the Soldiers' Settlement, Gunneville), reported that losses of stock were occurring on Westgrove Station, about 100 miles north of Roma, and arrangements were at once made to personally visit Westgrove. Mr. Harding, the manager, very kindly placed his motor-car, horses, and men at our disposal, and, although we rode over Westgrove, and made inquiry from adjoining stations, we were unable to find a single sick case suitable for examination. A number of carcasses were noticed lying about on Boxvale, but decomposition had advanced too far for an examination to be made. It was estimated that fifty or sixty deaths had occurred out of 900 animals. So far as can be ascertained we have nothing on record showing the actual cause of death when cattle eat caterpillars. Personally, I was of opinion that it was caused by the grubs setting up a mechanical irritation of the mucous membrane of the stomach and bowels, but from information obtained at Westgrove it is now

considered that death is probably due to a poison contained in the grubs. The treatment of affected animals can only be attempted in small herds, such as those on dairy farms, where the animals are regularly handled. Daily doses of raw linseed oil ($\frac{1}{2}$ to 1 pint), followed every four to six hours with 1 quart of linseed or oatmeal gruel, the white of two eggs, and 2 oz. of sweet spirits of nitre, were reported to have been successful in several cases.

The prevention of the pest appears to be an entomological question, and was therefore referred to the Government Entomologist. At present owners of large herds are practically helpless, and can only remove their cattle from paddock to paddock, according to the development of the pest in the various paddocks. It was pointed out that ringbarking was of little service, because for each tree destroyed numerous suckers grow up, which make even greater feeding ground for the grubs.

Mr. Harding and Mr. E. C. Alexander (head stockman on Westgrove) supplied the following information:—

History.—The affection was first seen on Westgrove in 1908, when deaths were attributed to cyanide poisoning, used for killing opossums. In 1913 similar caterpillars or grubs to those now on the station were seen, and large numbers of animals, chiefly weaners and heifers heavy in calf, died. About ninety-eight were found dead in one small area. The grubs are chiefly noticed in wet seasons, and do not disappear until warm weather sets in. Trees attacked by grubs are confined to the narrow-leaf ironbark, silver or broad leaf ironbark, young spotted gum, box, and small currajong.

Symptoms.—Animals appear dull, and exhibit the following brain symptoms:—Will readily charge, have peculiar gait, quivering of the muscles, die without struggling, and sickness only noticed for about two days.

Post Mortem.—The blood is very dark in colour, connective tissue is dark, and putrefaction present at time of death, particularly around neck. Lungs are enlarged and pale in colour, pleura easily detached. Stomach contains blackish-coloured fluid, but the mucous membranes are normal in colour, petechial spots on the peritoneum. The liver in some cases is enlarged and dark in colour, with an appearance when cut into as if it had been pin-pricked. The gall is normal.

A full report dealing with the particular grub referred to has been issued by the Government Entomologist.

Supposed Gidyea Poisoning.

It was reported in May last by Inspector Comiskey, of Urandangie, that cattle were dying in that district, apparently from eating gidyea. Losses generally occur when the trees are in pod and when green feed is scarce. The pods, after falling to the ground, are readily eaten by cattle, hence the suspicion that they are the cause of the trouble. After rain, when grass and herbage are available, deaths are not noted, although the pods appear to be as plentiful as previously. It was stated that cattle were dying when the report was submitted, but that no pods were on the trees, and, owing to the dry season, green feed was not available. The inspector, after investigating the cause of death for some weeks, was of opinion that it was due to the cattle eating the green leaves, especially those of the very young or stunted shrub-like gidyea, which was then plentiful. In 1919 feeding experiments were carried out at Roxburgh, with pods and leaves of the mature gidyea, with negative results. At the same time cattle were dying, probably from eating the new leaves of the young or stunted gidyea.

Contagious Abortion.

This disease has existed in the State for many years, but, according to official reports, not to any great extent. Although much has been written concerning this affection, and numerous experiments have been carried out for many years in various parts of the world, it appears from latest reports that much has yet to be learned, more particularly with regard to the best methods of elimination and control. A living vaccine is now used successfully in affected herds in various parts of the world. It has been suggested that animals are immune to the disease only whilst they carry in their system the living abortion bacilli. Therefore, to control the disease by this method all the breeding herd would have to be vaccinated annually for at least two or three years. The bull should not be allowed to animals for at least two months after their vaccination, by which time immunity takes place before pregnancy occurs. Contrary to previous ideas, recent research work indicates that the bull is seldom responsible for the spread of the disease. By means of the agglutination test, which, however, is not absolutely infallible, it is possible to detect infected animals which carry the organism, but few farmers are prepared to divide and maintain their herds in two distinct lots—viz., infected and non-infected animals. Further, it would involve the employment of special

attendants and the exercise of isolation precautions. Whilst thoroughly appreciating the serious financial loss entailed by an occurrence of this disease in a dairy herd, and the necessity for the most strenuous endeavour to limit its spread, there is still one phase of the subject that must be borne in mind: Statistics prove, in so far as they are available, that the majority of affected cows acquire a measure of immunity, and that only a small percentage become sterile. Many cows abort only once, others frequently do so a second time, but seldom on a third occasion. By this means the very great susceptibility to fresh infestation is greatly reduced, and cows carry their calves the full period. Thus it appears that in a herd where the disease has become established the majority of cows are only what may be termed as clinically affected for a relatively short period. If all the cows were simultaneously affected, within a period of two years the majority would be immune and the breeding again normal, with the exception of the small percentage which had become sterile. But as under natural conditions all cows in a herd are not simultaneously affected, the disease gradually spreads, and some years may elapse before the herd generally has acquired immunity.

The advisability of slaughtering all affected animals has been suggested, but in view of the information detailed above such action would appear unnecessarily drastic, and if carried into effect would needlessly deplete the dairy herds of the country, as well as entail serious financial loss, with no guarantee that the disease would be exterminated.

Tuberculosis.

During the year under review the tuberculin test was applied to 381 animals, as compared with 280 in 1921 and 160 in 1920. The number of positive reactions was 30, whilst 10 were doubtful and will be retested. Of the animals tested 130 were owned by Government departments, 212 privately owned, and 39 were subjected to the test prior to exportation.

The advantage to dairymen and other cattle-owners of application of the test free of any cost is gradually being appreciated. Many owners now realise that, apart from the public health point of view, it is most unprofitable to keep diseased animals running with healthy stock; but there are others who, through gross ignorance, will not voluntarily free their herds from this most infectious and insidious disease. It is intended to as far as possible utilise the services of the Veterinary Staff for the inspection of dairy cows supplying milk to our larger cities. At the present time, unless owners make application for the test to be applied, only suspected animals are tested. Some years ago it was suggested that dairymen who maintained their dairy herds free from tuberculosis by regular tests carried out by Government veterinary surgeons should be allowed some distinguishing mark on their milk carts, or perhaps a special coloured cart, which the public could easily recognise. It is considered that the general public would fully appreciate milk with a Government guarantee of freedom from this disease. If a few dairymen adopted this scheme, it is anticipated that it would be ultimately adopted by many others. Householders and others who may require milk for sick people, and more particularly for young children, would certainly prefer the guaranteed milk, even at a slightly increased cost.

Swine Fever.

Early in March one of the metropolitan meat inspectors reported that he had found lesions of swine fever in some pigs from the Boonah District, and his diagnosis was confirmed by the Veterinary Staff. The consignment consisted of twenty-nine pigs purchased from some nine different owners. Six carcasses revealed the typical lesions. An Order in Council was issued providing for the quarantine of all pigs within a radius of 12 miles from the Boonah Post Office. Although every effort was made to trace the source of infestation by thorough periodical inspections of pigs in the area, no definite information in that connection could be ascertained. As no further sickness was reported, the quarantine was lifted at the end of June.

Sheep.

The general health of the sheep has been good. For the last six months, owing to the drought conditions prevailing, parasitic diseases, such as the stomach-worm, tapeworm, and the blowfly pest, have not been seriously in evidence. With regard to the latter, it can now safely be said that important results have been obtained after years of experiments with various dipping mixtures and dressings. A simple, safe, and economical formula has proved very effective, which consists of 7 lb. of arsenic, 2 lb. soda ash, boiled in 100 gallons of water. This mixture is jetted into

the breech of the sheep at from 100 to 200 lb. pressure. The pressure varies according to the amount of wool on the animal. As females are attacked in the majority of cases, the treatment gives protection for about three months, at a cost of about one-fifth of a penny per head. Sheepowners may be assured that their ewes can be carried over the lambing period without the great losses, both of lambs and ewes, they have experienced in the past. Of course, other parts of the body are attacked, but it can be confidently stated that 90 per cent. of the attacks are in the breech. Experiments are now being carried out at Dalmally in the direction of finding a process or specific to protect the whole body. Another feature of jetting with arsenic is that a jetted sheep is a first-rate fly trap, in that enormous numbers of flies are killed.

Reports in regard to the nasal fly have been received from various districts. It is regretted that little can be done to ward off attack in view of the limited knowledge available. This pest, which is seldom responsible for the death of animals, lowers their vitality and makes them a prey to other parasites.

The Slaughtering Act of 1898.

The volume of slaughtering for human consumption has considerably increased during the year, as will be seen on perusal of the following comparative figures, compiled from the returns of permanent officers of the Department. The returns of police officers in country centres are not included:—

		1920-1921	1921-1922.
Bullocks	.. .. .	62,570	79,268
Cows	.. .. .	15,605	24,848
Calves	.. .. .	21,345	27,018
Sheep	.. .. .	377,320	465,731
Pigs	.. .. .	17,325	21,977

In addition, 164,825 pigs were slaughtered at the various bacon factories. This increase has created a great deal of additional work for all inspectors, so much so that it is necessary to detail another officer for the metropolitan area. Many persons entering the trade required considerable information from inspectors concerning the erection and renovation of shops and slaughter-yards. Inspectors have been successful in their efforts to impress many of those who enter the business with the necessity for the equipment of their buildings in accordance with the standard required by the regulations. The low price of cattle has created a keen competition amongst the butchers, and in many instances stockowners have been compelled by force of circumstances to commence operations on their own account to clear off some of their surplus stock, and quite a number have purchased established businesses at a high cost. At the same time, owing to the low price of stock, illegal slaughtering has been prevalent in almost every district. Several flagrant breaches of the Act have been investigated, but few prosecutions instituted owing to the difficulty experienced in securing sufficient evidence to convict.

The annual return, supplied to the Government Statistician, of stock slaughtered up to the 31st December last in the Brisbane District, including Sandgate, North Pine, Wynnum, Manly, Cleveland, and Redland Bay, indicates the increase in the volume of consumption in that district, due mainly to the increased population and the low price of meat:—

Cattle slaughtered	.. .. .	46,809
Calves slaughtered	.. .. .	25,072
Sheep slaughtered	.. .. .	318,070
Pigs slaughtered	.. .. .	5,902

Returns of stock slaughtered for human consumption are now regularly received from police officers in 198 country centres, which show the following totals:—

Bullocks slaughtered	.. .. .	60,542
Cows slaughtered	.. .. .	28,648
Calves slaughtered	.. .. .	6,651
Sheep slaughtered	.. .. .	110,799
Pigs slaughtered	.. .. .	11,082

FRUIT FLY INVESTIGATIONS.

The Minister for Agriculture and Stock (Honourable W. N. Gillies) has made available the following Progress Report, No. 8, for the months of December-January, 1922-23, of the Entomologist stationed at Stanthorpe (Mr. Hubert Jarvis).

FRUIT FLY.

The Adult Fly.

During the last two months the numerical strength of the fruit fly (*Chatodacus tryoni*) in the Granite Belt orchards has been considerably augmented. This fact is to be attributed mainly to natural increase, for, since its first occurrence therein was recorded on 17th November, 1922, there has elapsed ample time for the maturing of at least three broods of fruit flies, to carry on the work of infestation. Although undoubtedly doing much damage in certain localities, yet the fruit fly is not this season the scourge it proved itself to be last year; many orchards, in fact, showing an almost complete immunity from its attacks, and notably those orchards, the owners of which have adopted the only really satisfactory means of dealing with the pest, i.e., that of the careful gathering of all infested fruit, both on the ground and on the tree also, and the effective destruction of such fruit. If every single fruit grower in the Granite Belt area would co-operate in this work of cleaning up, it would go far towards establishing a practical control of the fruit fly in that district.

Trapping the Fly—(a) Personal Tests.

Fruit fly lures, now on the local market, have not (as personal tests would indicate) so far proved of material help in controlling the pest. Experiments with these lures have been very disappointing when such lures have been placed in trees bearing fruit. The fruit fly itself, while it is on the tree, is undoubtedly the attractive agent of primary importance, from the point of view of potency.

(b) Tests by Orchardists.

Better results in fruit fly capture have been obtained by placing lures in trees from which all fruit has been gathered. One or two orchardists have reported that they have, in this manner, found "Harvey's Fruit Fly Lure" successful in trapping both the male and female of *Chatodacus tryoni* (the so-called Queensland fruit fly), one such catch extending over a period of two weeks, resulting in 200 fruit flies, of which about 60 per cent. were females. These flies were caught in the well-known Japanese glass fly-trap, the trap being suspended from a branch of the tree, and not, as is the usual practice, placed on a piece of flat board, prized between two of its branches.

Repellants.

Cresote, coal-tar, and other substances are being tried as fruit fly repellants, but with, so far, negative results.

Poison Baits.

Experiments are also being made with poison bait sprays. For many years past various soluble and insoluble poisons have been tried as a possible means of controlling fruit flies, notably *C. capitata* (the Mediterranean fruit fly of New South Wales), *R. pomonella* (the apple maggot), *Dacus cucurbitae* (the melon fly). These poisons, that comprise arsenate of lead, Paris green, barium chloride, potassium arsenate, &c., dissolved or suspended in water, to which is added some sweetening agent, such as sugar, honey, or molasses, are applied to the fruit trees carrying fruit as a poison bait; and it is claimed that fruit flies, in common with other insects, are attracted to, and feed on, one or other of these "poisoned sweets," and so perish prior to depositing their eggs on the fruit. The usual method of application is by means of some form of sprayer. In practice we have found that, where a large number of trees are to be treated, a power sprayer would be an advantage; but for a smaller number of trees an ordinary garden syringe answers the purpose admirably. The point aimed at is to get about 1 pint of the poisoned liquid evenly distributed in fine droplets over, say, each tree. This can often be accomplished by shooting it into the air close to the tree, when it will fall from above: it is, however, not necessary to adhere to this method. The spray can also be applied to one or two main branches only of each tree, thus avoiding fruit and foliage injury—a very important consideration when using such poisons as arsenate of potash and arsenate of soda, both of which are more deadly fly-poisons than arsenate of lead, but have a caustic-burning effect on the leaves and fruit of the trees if applied as a foliage spray.

A fruit fly bait originated by C. W. Malley (Entomologist, Pretoria, S.A.) and used by him for some years against the citrus pest (*Ceratatis capitata*, the Mediterranean fruit fly) has, it is claimed, proved successful in controlling it. The poison entering into "Malley's Fruit Fly Remedy" is arsenate of lead, in the proportion of 3 oz. to 4 gallons of water to which is added about 2½ lb. of sugar (or less of molasses if this be used).

Experiments are now being carried out in this district in order to test the efficacy of this and various other poison bait sprays, as a possible control of the Queensland fruit fly (*Chetodacus tryoni*); various tests will also be made of several methods of application. Personally, I do not altogether favour the method of sprinkling the bait over the foliage and fruit of the trees, for the reasons above stated, and also for considerations of economy. The method now being used in Spain and Italy against the olive fruit fly (*Dacus oleæ*), of applying the spray to special spray containers (Letvientes Compannette method), these being disposed amongst trees throughout the orchard, is proving there, and should prove here also, much more satisfactory, being undoubtedly cheaper, more deadly to the fly, and obviating all risk of foliage burning, &c. It is hoped that early next season a vigorous poisoning campaign will be in operation against the Queensland fruit fly. But this method of control, or partial control, will, as with all other measures that may be pursued, prove of little worth without the active co-operation of every orchardist in its adoption. This necessity for concerted action in the fight against the fruit fly is, I believe, realised by a large proportion of the growers: it has, in fact, already brought forth much fruit, insomuch as there is now a persistent effort on the part of the majority to clean—from the ground and from the trees—all fruit harbouring fruit fly maggots, and thereupon to effectively destroy it.

Fruit Fly in Grapes.

On 20th January, 1923, Inspector F. Becker brought to our office specimens of Black Hamburg grapes, harbouring fruit fly maggots; these grapes were taken from a vine growing at Rivertree, New South Wales. The maggots in question have since given rise to the mature insect—*Chetodacus tryoni*. There is no record to date of fruit fly occurring in grapes in the Granite Belt area, although this association is met with exceptionally in areas nearer the coast.

The "cleaning up" work now being carried out adjacent to our south-east border in New South Wales should prove of much benefit, not only to ourselves, but also to our neighbours resident there.

Parasites.

The fruit fly parasite (*Diachasma tryoni*), introduced by me into this district in March, 1922, has not so far been recovered, and it is proposed to secure a further supply of it from Brisbane in the near future.

A still more important parasite is, I think, the Chalcid wasp (*Syntosmophyrum indicum*, Silvestri). This little wasp, a parasite of the Mediterranean fruit fly, attacks the maggot in the fruit, tracking it to the end of its burrow, and according to Newman (Entomologist, West Australia) laying as many as 12 eggs in each maggot; he also states that the insect is very prolific laying upwards of 200 eggs. Should it be possible to introduce and acclimatise this little wasp in the Granite Belt orchards, it ought—on this being realised—to prove a control measure of importance, and an effort to bring about this introduction should—I think—be made.

OTHER INJURIOUS INSECTS.

Wood-boring Weevil—*Orthorhinus cylindrirostris*.

Grape vine cuttings harbouring the larvæ or grubs of the elephant weevil (*Orthorhinus cylindrirostris*) were brought to this office. This weevil is quite well known as a minor pest of Citrus, and other economic plants in Queensland, and it has even been recorded boring through lead pipes (City Electric Light Co., Brisbane). The larva is a stout, fleshy, white grub, armed with strong sharp mandibles. When fully grown it measures just over ½ an inch in length. This is, to my knowledge, the first record of its attacking the grape vine in the Stanthorpe area. It is, however, an isolated case, and it does not appear that it will prove a pest of this plant of any significance. The beetle is quite well known to everyone; it has a long snout or trunk (hence its common name "Elephant beetle"), its front legs are very much longer than the others, and it has a habit of flying into rooms at night, attracted by lights.

Tomato Fly.

The maggots of this little shining green fly (*Lonchea splendida*) are often to be found now in ripe tomatoes, and being mistaken, under these circumstances, for the maggots of the fruit fly, *C. tryoni*, cause a great deal of alarm. This alarm is, however, unnecessary, the fly in question never (to my knowledge) injuring sound tomatoes, or any fruit. Its habit is to lay its eggs in some crack or injury present in the fruit, the surface of which has broken, or in overripe fruit. Its preference for injured tomatoes has earned it its name of "Tomato fly." It has also been bred by me from cucumbers and from melons. So far, I have no record of the Queensland fruit fly (*C. tryoni*) attacking tomatoes.

Tussock Moth—*Orgyia postica*, Liparidæ.

The caterpillars of this moth are causing a good deal of trouble in some orchards and private gardens by devouring the leaves of apple and plum trees, and also, too, the foliage of cultivated shrubs. The young larvae, soon after being newly hatched, are about $\frac{1}{4}$ -inch long, dark-brown in colour, and clothed with short hairs. They are gregarious (feeding together), connecting themselves to the leaves of the plant with fine silken threads. They grow to a length of about $1\frac{1}{4}$ inches, and are then curiously tufted with little bunches of long hairs; the two tufts at the end of the body being much longer than the others. The male moth measures about $\frac{3}{4}$ of an inch across the expanded wings, it is a smoky-brown colour, and remarkable for its comb-like antennæ. The female moth would ordinarily scarcely be taken for a moth at all, being wingless and merely a sack of eggs. It may sometimes be found crawling on the branches of the trees. The caterpillars being voracious leaf feeders should be fairly easily controlled with the ordinary codling moth arsenate of lead spray, i.e., about $\frac{1}{2}$ oz. arsenate to 20 gallons of water.

FUNGUS DISEASES.

(1) Apple Bitter Rot.

Specimens exhibiting this disease were forwarded to Mr. H. Tryon, Government Entomologist and Plant Pathologist, illustrating two instances of occurrence. He reports on them as follows:—

"I received in Brisbane yesterday (1st February) two apples (Rokewood var.) forwarded through Mr. H. Jarvis, Entomologist, as manifesting a disease giving him some concern so far as relates to the trees of the variety exhibiting it. This fruit affection of the apple is well known to me, the conspicuous sunken roundish dark blotches of decay, with little raised points disposed in concentric rings within them, being a very characteristic feature. It is a malady that is termed 'Bitter rot,' and one by no means confined to the variety on which it has occurred. It is, moreover, caused by a fungus named *Gleosporium fructigenum* in its present stage of growth in the fruit, and that in its final stage is named *Glomerella*—the latter being the resting one. It, in fact, not only occurs as a fruit disease as the specimens indicate, but also manifests itself, or may do, as a bark canker. These cankers commence as rounded or oblong sooty-black sunken spots, from one to several inches long, and presenting more or less ragged edges. These may occur in wood up to 3 inches in diameter; and ultimately the entire bark comprised in them is killed, as also the cambium and still deeper tissue beneath, with resulting fissuring lengthwise on the branch and transverse cracks. Beneath some of the loose outer bark thus brought about an almost black encrustation may occur, and in minute cavities in this are found the fruiting organs, and spores of the *Glomerella*. With regard to the diseased fruit the little raised points are composed of innumerable massed oblong fungus spores, that, adhering together (*Gleosporium*—sticky spore), form a highly infective material, more potent than are the spores in the bark form of the fungus—*Glomerella*. Not only so, but the fungus long persists upon the apples or their drying up, and becoming mummified, and whether they remain on the tree or fall to the ground. However, the more permanent life of the parasite is in association with the bark. And thus, not only do apples become affected one from another by spores washed off by rain from diseased spots on to sound areas, but the apples may infect the bark (the cankers generally developing near where diseased fruit has been attached), and so the cankers, in which the fungus overwinters, originate fruit disease when the time arrives in its growth for infection to take place. In the case of fruit, the fungus attack commonly follows mechanical or other injury.

A consideration of these facts will suggest a line of treatment that obviously can only be of a preventative nature, such as the following:—

1. Remove from the trees all apples showing bitter rot, so also remove all mummified fruit on which it has occurred, and similarly gather all from the ground and burn the lot.

2. Similarly cut off and burn cankered wood or remove it with a scraper, painting Bordeaux mixture on the wound. The upper parts of the trees are where these generally occur.
3. Spray with Bordeaux mixture (4 lb. fresh lime, 4 lb. copper sulphate (bluestone), 40 gallons water) just before the buds open, and then from time to time until the fruit is full-grown or even commencing to ripen. (Note.—Arsenate of lead may be added to the Bordeaux mixture when treatment for codling moth has also to be prosecuted.) Care should be taken lest the Bordeaux mixture contain an excess of bluestone or rather any undecomposed, using a 10 per cent. solution of potassium ferrocyanide (yellow prussiate of potash) as a test in ascertaining its presence, if any."

(2) Brown Rot—*Monilea fructigena*.

This fungus trouble affecting stone fruits is causing serious loss in the Granite Belt orchards, nor is the seriousness of the position fully realised by orchardists, who are unwittingly spreading the disease by allowing diseased fruit to remain on the trees and on the ground. It is quite common to see mummified fruit on the trees all through last autumn and winter, thus carrying the disease over to the next season. Under favourable (moist) conditions brown rot increases very rapidly, spreading destructively from tree to tree, and soon ruining almost the entire crop of peaches or plums. Energetic measures should be taken to control this disease, which attacks not only the fruit but the wood of the tree also. A late winter spray of bluestone (copper sulphate) and water used at a strength of about $2\frac{1}{2}$ lb. to 40 gallons followed by a further spray in the spring before the blossoms open with Bordeaux mixture, 5:6:40 will probably be found helpful. It is important to destroy, by burning, all fruit and wood found to be affected with this serious disease.

FIELD WORK.

Visits of inspection to various parts of the district and experimental work in the orchards have, necessarily, during the last two months taken up a good deal of time. The insectary supplied by the Department is now completed, and will prove invaluable for carrying out under natural conditions many experiments hitherto impossible—or almost so—in the laboratory.

OFFICE WORK.

Numerous callers, letters, and general office-work have also, as in the past, claimed considerable time each week. It is anticipated that, as the fruit season closes, it will be possible to devote more time to insect life-history work, bearing on noteworthy pests, affecting deciduous fruit trees, or possibly vegetables.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist and W. D. FRANCIS,
Assistant Botanist.

SOUTHERN GHITTOE (*Halfordia drupifera*).

This tree grows to a large size in the rain forests (scrubs) of the MacPherson Range, Blackall Range, and Imbil. Smaller trees or shrubs of the same species are often found growing in the sandy soils adjacent to beaches in places such as Southport and Coolangatta. The bark on the larger trees is somewhat wrinkled and inclined to be finely scaly. It is grey or yellowish in colour, and when cut is pale brown or yellow. The timber is yellowish-brown and very hard and heavy. It is extensively used now for making fishing-rod tips, as it is tough and fairly flexible. The North Queensland species, *Halfordia scleroxyla*, which is known as "Ghittoe" or kerosene wood, is very closely allied to the Southern tree, and upon investigation the two trees may prove to belong to one species, as the differences, if any, between them are slight. The larger Southern trees attain a height of about 100 feet and a barrel diameter of over 2 feet.

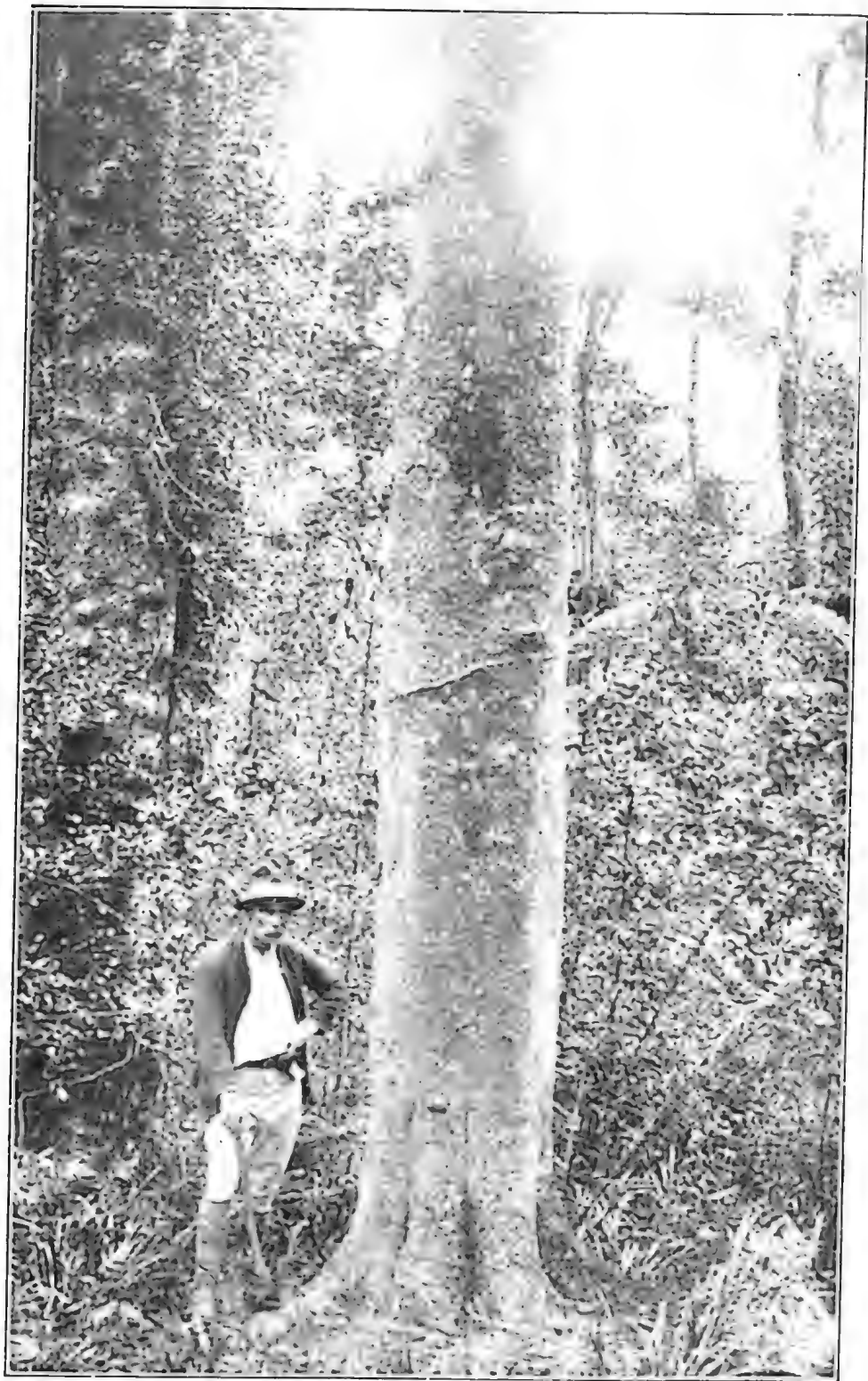


Photo. [by the Authors.]

PLATE 43.—SOUTHERN GITTOE (*Halfordia drupifera*).
A tree on Roberts Plateau, National Park, McPherson Range.

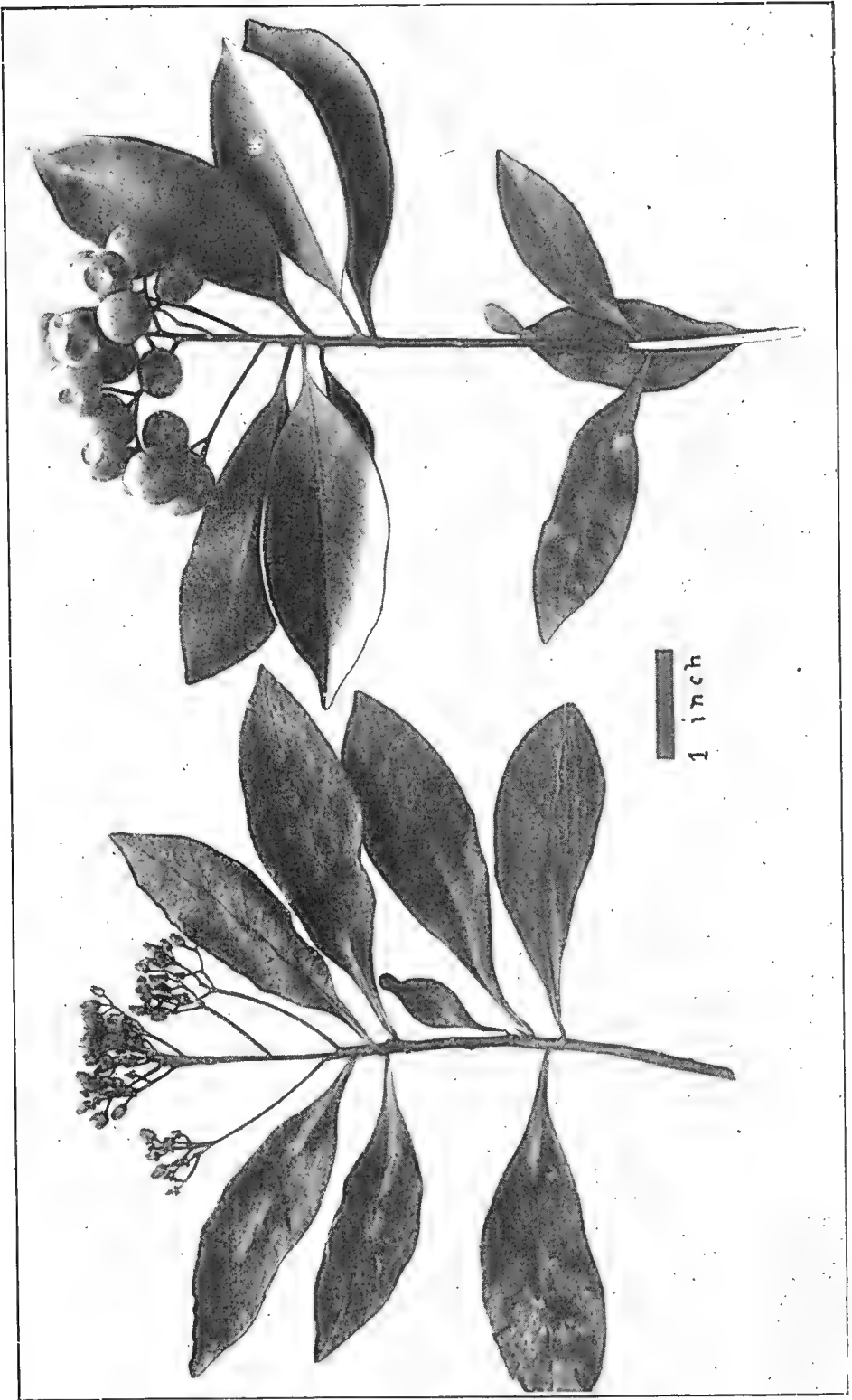


PLATE 44.—SOUTHERN GHITTOE.

Photo : Dept. Agriculture and Stock.]

NOTES ON THE QUEENSLAND SUGAR INDUSTRY.

By H. T. EASTERBY, Director of Sugar Experiment Stations.

The cane sugar industry in Queensland, like many others, commenced on an insignificant scale early in the history of the then colony.

In 1849, proposals were made for the formation of a sugar company in South Brisbane, and there is said to have been a small plantation at Eagle Farm, on the Brisbane River, but apparently no sugar was made. Sugar-cane was cultivated in the gardens of several people in Brisbane about this time, and a considerable amount was also grown in the Government Botanic Gardens.

The first sugar made in Queensland of which there is any official record was manufactured by Mr. John Buhot in 1862. In 1863, Captain Louis Hope had 20 acres under cane on Ormiston plantation, near Brisbane, and that gentleman is generally conceded to be the father of the Queensland industry. The first sugar-cane plants were most probably imported from Java and Mauritius, and about this time the Queensland Acclimatisation Society took active steps in bringing over a large number of varieties. A tremendous impetus was given to the industry when land was made available for sugar-growing during some years by the Government, on remarkably easy terms, and in 1865 as much as 18,290 acres had been taken up for cane planting. Shipments of cane were this year also made to New South Wales farmers for planting.

The early stages of the industry were almost entirely devoted to the production of cane and the extension of land under cultivation. In 1866 so great was the demand that there was actually a scarcity of cane for planting. By the end of 1867 there were nearly 2,000 acres under cane and six mills had been erected, which between them manufactured 168 tons of sugar. There was, however, an insufficiency of mills, which caused heavy losses to the fariners, but millowners did well as they could buy cane for 4s. a ton.

Up to this time the industry had been carried on entirely in Southern Queensland, but it now began to spread to Bundaberg, Mackay, the Herbert and Johnstone rivers, and Cairns. It is in these places to-day that almost the entire output is manufactured, the extreme Southern districts making very little.

Sugar-growing continued to prosper, more land was brought under cultivation, and steam mills quickly superseded the antiquated cattle and horse-power erections. The production of sugar from 1870 to 1880 is given as follows:—1870, 2,854 tons; 1880, 15,681 tons.

During the next decade, 1881 to 1890, the production of sugar in tons varied from 16,660 to 68,924; and from 1891 to 1900, 51,219 to 163,734. During the period under consideration a large number of small mills were erected in most of the sugar-growing areas of the State as well as many large factories. On the decline of prices owing to the stimulation of bounty-fed sugar in Europe most of the small mills went under. During this time also a number of modern mills were erected under the Sugar Works Guarantee Acts with capital found by the Queensland Government. These were known as "Central Mills" and led to a further reduction in the small privately-owned mills. In 1901, there were some sixty sugar-mills in existence in Queensland.

From 1863 to the advent of federation in 1901, the sugar industry was almost entirely carried on by labour from the South Sea Islands. This class of labour, while eminently serviceable and of great use in opening up the country, was always distasteful to the majority of Australians, and when federation took place steps were taken to make the industry entirely a "white" one. This was accomplished by passing a measure prohibiting Kanakas entering Australia after 1904, and providing for the deportation of those who had already been engaged within a certain period. This only left some 2,000 Kanakas in Queensland, the majority of whom had resided for years in the State and had married. About the same time the Federal Excise Act came into operation, which provided for a protective duty of £6 per ton on all foreign sugar. An Excise duty was collected on sugar manufactured in Australia and a rebate was given to that in which white labour was used. These Acts have since been repealed. The years that have elapsed since federation have seen a further decrease of the small, uneconomic mill and a general increase in the efficiency and management of the larger surviving mills. This has been followed by the growing of better varieties of cane by the farmer and a general improvement in the tonnage of cane and sugar per acre by improved methods of cultivation. At the end of 1922 the number of sugar-mills was forty-two. This includes three new large and thoroughly up-to-date mills erected since 1913—viz., Inkerman, Babinda, and South Johnstone. The first of these is in the Lower Burdekin district, south of Townsville, and is the property of Messrs. Drysdale Brothers. The Babinda and South Johnstone mills have been erected by the Queensland Government to develop the rich tropical lands south of Cairns.

Sugar is grown in Queensland from the 28th to 16th degrees of latitude, the bulk being produced within the tropics. No difficulty is experienced in securing white men to undertake the work in field and mills at the high rates of wages now paid. Although conditions are somewhat trying in the North during the last two months of the year, yet the men are healthy, the death rate is low, and sunstroke rare. The general standard of the health of school children is considered good, and epidemics are stated by medical men to be attended by a lower mortality than in the Southern portion of Australia, and that with proper care the probability of children in the North living to adult ages is greater than in the Southern portion of Australia. It is considered that most prevalent cases of tropical complaints are preventable.

Sugar-cane belongs to the graminaceæ or grasses. Its botanical name is "*Saccharum officinarum*" but it is sometimes called "*Arundo saccharifera*." It is considered by botanists that all the cultivated varieties belong to one species; but there are said to be strong reasons for the belief that there are more than one species.

These have been divided as follows:—

1. The kind known as "*Saccharum officinarum*."
2. "*Saccharum violaceum*," being canes with violet leaves of which we apparently had an example in this country in a cane introduced from New Guinea by Mr. H. Tryon, known as N.G. 64.
3. "*Saccharum sinense*," Chinese cane. Stubbs says the chief specific difference is said to reside in the disposition of its panicle, which, unlike that of the "*Saccharum officinarum*," is oval and ornamental. Other divisions have also been made by botanists.

Varieties of cane naturally embrace slight to extreme variations. The variation between the two principal varieties grown in Queensland—viz., Badila and Demerara 1135—is shown in the following brief descriptions.

Badila or New Guinea 15.

A dark-purple to black-coloured cane. Stout sticks, with pronounced white waxy rings at nodes. Internodes usually 2 to 3 inches long but sometimes longer, especially in ratoon cane. Habit erect; foliage also somewhat erect and very green. Eyes generally full and prominent; trashes easily; sparse arrower. The foliage of very young cane has a slight reddish tinge; flesh white and highly saccharine; a remarkably heavy cane weighing 1 lb. per foot. Greatly appreciated by labourers, as it is so easily cut, trashed, and loaded.

Demerara 1135.

A brownish-red cane of moderate stoutness and a strong ratooner. Erect in habit, so that it is eminently suited for close planting. Joints about 4 inches long, parallel-sided. Foliage rather light in colour, sparse and upright. Arrows freely in the North.

From the beginning of the cultivation of the cane in Queensland it is estimated that quite 1,000 different varieties of cane have been introduced, while several thousand seedlings have also been raised. The number of varieties in commercial use to-day, however, may be stated to be about forty-five, but by far the greatest amount of cane grown consists of the two varieties, Badila and D. 1135, mentioned above. The former is the favourite on Northern cane areas, the latter in the South.

The chemical analyses of these two varieties, from a milling point of view, are as follows:—

Variety.	° Brix.	Sucrose in Juice.	Purity of Juice.	% Fibre.	% Commercial Cane Sugar.
Badila ..	23.0	21.93	95.47	9.62	18.20
D.1135 ..	19.47	18.06	92.70	11.00	14.50

Sugar-cane grows as high as 10 to 15 feet, but stalks as long as 27 feet have been measured. Some varieties are erect in habit, as are the two just mentioned, while others incline to "lodge" or assume a recumbent position when heavy, or they may be blown over by high winds. The roots are fibrous and lateral, and the majority of varieties are comparatively shallow rooters, but some are known as "deep-rooting" canes.



Photo : Dept. Agriculture and Stock.]

PLATE 45.—LOCOMOTIVE ON RUSSELL RIVER BRIDGE, BABINDA.

The stalk is cylindrical and is composed of what are known as "nodes" and "internodes." The nodes carry what are termed the "eyes" of the cane placed on alternate sides, and it is from these "eyes" that the cane is generally propagated. The leaves are alternate and opposite, and vary in length and width. The Badila cane has large, semi-drooping foliage, while the foliage of D.1135 is narrow and erect. The leaves clasp the stalk for some inches and then recede and when mature fall off, forming what is known in the canefields as "trash." When the cane plant is mature it throws up what is termed an "arrow" which develops a panicle of flowers. Within recent years the true seed of the cane plant has been discovered in the panicle, and the canes that have been grown from this seed are termed "seedlings." Cane does not arrow universally in Queensland; it does so far more frequently in the North than in the South, and there appears no doubt that climatic influences play a large part in the matter.

If a cane stalk be examined there will be found at the node several rows of dots. These produce the roots when that portion of the cane is planted in the ground.

In addition to the varieties introduced from other countries, a large number of seedlings grown from the actual seed in the cane have been raised by the Queensland Acclimatisation Society, the Colonial Sugar Refining Company, and the Bureau of Sugar Experiment Stations. As is usual in seedling work, few of these are of commercial value, but the seedlings that are successful compensate for the large number that have to be discarded.

Soils.

The land in Queensland used for growing sugar is included in a long, narrow coastal belt which is not continuous. Those parts which are suitable are separated from each other, often by considerable tracts of non-sugar producing country. The latter, owing to deficient rainfall or poorness of soil, are not utilised for cane. The sugar belt in Queensland is included between latitudes 16 deg. and 28 deg. South, but the bulk of the output is produced from Mackay north.

Cane soils vary considerably in character and composition. Cane as a plant demands an abundant supply of moisture, and so requires retentive soils. The open red porous soils of volcanic origin require frequent falls of rain to produce good crops of cane, and this, unfortunately, does not always take place in the rich soils of the Woongarra and Isis scrubs in the Bundaberg and Childers districts. The following classification of Queensland cane soils was made by Maxwell, a former Director of the Sugar Experiment Stations:—

District.	Soils.
Cairns	Partly shaly, sterile soils, but in the main deep, alluvial, sandy loams; also rich, red volcanic soils.
Mackay	Shaly in parts, with better alluvial over the lower levels; mixed volcanic and rich siliceous alluvial.
Bundaberg ..	Rich alluvial delta soils, interspersed with sterile soils and deep, rich, red volcanic soils.

The bulk of the sugar soils can be stated to be from good to rich alluvial, such as river flats and the deep red volcanic soils of considerable depth. The nature of the country is generally designated "scrub" and "forest." The North Queensland scrubs are really jungles, carrying a thick growth of what is known as scrub timber, such as silky oak, bean, pender, kauri, milkwoods, Johnstone River hardwood, interlaced with lawyer vine and other creeping plants, while the stinging tree is also conspicuous. Forest country usually consists of ironbark, bloodwood, Moreton Bay ash, bluegum, poplar-gum, and acacia.

Weather Conditions.

Hot, humid conditions are the best for the sugar-cane plant, and, fortunately, these generally obtain during the period of the maximum growth of the crop in Queensland. The wet season is usually synonymous with the three hot summer months of January, February, and March.

Although the weather is hot and humid during this period, the higher temperatures experienced in the drier belts of Australia are not common. A temperature of 100 degrees is rarely recorded. It is unusual for the thermometer to show much

above 90 degrees, even in the middle of summer. Indeed, during times of heavy rain, the weather becomes comparatively cool, but as soon as the sun reappears, the atmosphere becomes steamy and the growth of the cane is vigorously promoted.

On the coast of Queensland, where sugar is grown, the greatest rainfalls occur where the mountain ranges come close into the coast. Where they are considerably distant, as at Bundaberg and Ayr, the lowest precipitations take place. Consequently, the greatest amount of rain falls at Babinda and Innisfail, where the lofty ranges of Bartle Frere and Bellenden Ker are not far from the seaboard.

The following table shows the average annual rainfall in each of the sugar districts:—

District.			Average Annual Rainfall in Inches and Hundredths.	District.			Average Annual Rainfall in Inches and Hundredths.
Mossman .. ..	..	..	82.91	Proserpine .. ..	..	..	76.96
Cairns .. .. .	..	..	90.49	Mackay .. .. .	..	..	68.52
Mulgrave .. ..	..	..	81.91	Bundaberg .. ..	..	..	44.40
Babinda .. .. .	..	..	165.00	Gin Gin .. .. .	..	..	37.71
Innisfail .. ..	..	..	149.20	Childers .. .. .	..	..	42.07
Ingham .. .. .	..	..	80.53	Maryborough ..	..	..	46.14
Halifax .. .. .	..	..	89.17	Pialba .. .. .	..	..	38.04
Ayr .. .. .	..	..	44.48	Nambour .. .. .	..	..	60.93
Bowen .. .. .	..	..	40.60	Beenleigh .. ..	..	..	48.87

Humidity

The mean relative humidity or percentage of moisture in the air is a most important factor in the growth of cane. The table hereunder gives the percentage of relative humidity in the principal coastal towns in the sugar districts at 9 a.m.:—

Place.			Percentage of Humidity.	Place.			Percentage of Humidity.
Bundaberg .. ..	..	..	69.0	Innisfail .. .. .	..	..	80.0
Mackay .. .. .	..	..	75.0	Cairns .. .. .	..	..	70.2
Ayr .. .. .	..	..	68.0				

Irrigation.

The climatic variations in Queensland from year to year are often so great that canegrowing is only certain in those districts possessing a high average rainfall. Districts with an average rainfall of 50 inches and under suffer exceedingly during dry spells, and irrigation would prove highly payable in such localities.

At the present time the only canegrowing district that uses irrigation water to any extent is the Lower Burdekin, situated some 40 to 50 miles south of Townsville. On the north side of the Burdekin River irrigation has been practised for a number of years, the plants used being the property of the farmers. Water is found at shallow depths, and is easily obtainable by sinking spearheads. On the south side of the river the Government have installed a complete system, which is available to growers of cane. Wells have been sunk and the pumps are electrically driven from a central power-house.

The cost of applying irrigation water on the Lower Burdekin is comparatively high, even though the most economical method is used. Consequently, there is a tendency to do with as little of it as possible, and, in many instances, to postpone the application if rain appears probable. This frequently leads to the suffering of the crop should rain fail to fall and the irrigation has not been carried out.

Water is not applied scientifically to cane crops on the Lower Burdekin, so that the greatest efficiency is not secured. This, however, is largely due to the high cost of application. The method of irrigation is to run the water in shallow furrows between the cane drills, usually made with the disc harrow known as the Cotton King Cultivator. The water is generally conveyed by fluming to the main ditch running on the headland at right angles to the cane rows. The water is then admitted to the channels between the cane, but as no attempt has been made to grade the land a great deal of water is often wasted.

In Hawaii the water is usually applied directly in the furrow or drill in which the cane plants are growing. The preparation of the land is more expensive, as it is laid out for irrigation according to the land contour, and the drills are cut into short sections so as to secure an even distribution. This method secures the largest economy of water. In the Queensland system, as practised at Ayr, it is not generally possible to evenly distribute the water over all the land, consequently some of the area goes short while other parts obtain too much. This system, therefore, involves the greatest waste of water, but is the cheaper as far as actual application is concerned. This is, of course, a vital point in the cultivation of cane in Queensland, where the costs of labour are so high. It is usual to only make one or two, or at most three, applications of water on the Lower Burdekin, but these are large in volume, running up to 6 inches.

In Hawaii, on the contrary, the applications are smaller, but far more frequent, ranging from the equivalent of half-an-inch of rainfall per week to 3 inches or more, as the crop makes greater demands upon the soil. These irrigations are carried on until the crop nearly reaches maturity; they are then stopped, so that the absence of water may have the effect of ripening the cane crop. With such a system the application of manures can be carried out in the most satisfactory manner, and the combined use of water and fertilisers renders the cane crops of Hawaii the heaviest in the world, while the production of sugar per acre is also higher than elsewhere.

As irrigation for cane must eventually play a large part in sugar production in the drier cane areas of the State, the matter will ultimately have to be taken in hand, so that the water may be applied in the most economical way, and no doubt the Hawaiian system, which has proved so successful, will be tried. It is a noteworthy fact that much larger crops can be grown with irrigation properly applied in dry areas than on lands where the rainfall is plentiful.

General.

During the past twenty years a great improvement has taken place in mill work, and the co-efficient of work and recovery of sugar is now much more satisfactory although there is still room for better work. The average tons of cane required to make a ton of sugar has dropped from 9.20 in the decade 1899 to 1908 to 8.68 in the decade 1909 to 1918, while in 1915, owing to the high density of the cane caused by a dry season, it fell to 8.2 and 7.76 in 1919.

The growing of sugar-cane in Queensland compares favourably with other countries when it is remembered that with slight exceptions it is carried on by a large body of small farmers (about 4,600) who do not possess the necessary capital to develop their farms in the same manner that the large millers of Hawaii and Java can do, with the added advantage in the latter island of remarkably cheap labour.

In Queensland, in favourable seasons in the North, 50 to 70-ton crops of plant cane are common, but the average is pulled down by the want of proper cultivation and fertilising in some instances, drought and frosts in Southern sugar districts, and the ratoon crops. The cane per acre of recent years has averaged about 18 tons, which is higher than it was some time ago. The varieties of cane in Queensland are, as a whole, better than in either Java or Hawaii, as they are higher in sugar percentage. Mill work in the best factories in Queensland is quite as good as elsewhere, but a number of mills require bringing up to date and their efficiency should be increased. This, at the present time, is a difficult matter, due to high price of materials.

Due to the recent awards made by the Arbitration Court in Queensland, the sugar industry in that State is probably the highest paid agricultural industry in the world. Australia is the only country in the globe that is attempting to grow cane sugar with white labour.

Apart from its great economical value, however, the sugar industry in Queensland possesses a far higher importance. In 1911, a Royal Commission on the industry was appointed by the Federal Government. This body sat for upwards of twelve months and collected a wealth of evidence in all parts of Australia, and its report was finally handed in at the end of 1912. It stated emphatically that the Queensland sugar industry was one of national importance, the maintenance of which vitally affected every citizen of the Commonwealth. By no other means at present visible can our vast Northern littoral be peopled and defended, and for this reason alone, apart from its enormous economic importance, it deserved the utmost encouragement and support that our Federal and State Legislatures can give it. The Commission have put this view in the strongest terms when they say—

“The problem of the sugar industry to-day is not, save in subordinate respects, a problem of industry, of wealth, or of production; it is primarily and essentially a problem of settlement and defence. No nation can afford to regard lightly the development of its industries, the progress of its wealth, or the economic efficiency of

its productive machinery. But, important as these things undoubtedly are, they rank, as regards the sugar industry, on an inferior plane. The Commonwealth to-day is brought face to face with one of the greatest problems that has ever taxed the ingenuity of statesmanship—that of the settlement of tropical and semi-tropical areas by a white population living under standard conditions of life. And intimately associated with this problem is the question of national defence.

“If the ideal of a White Australia is to become an enduring actuality, some means must be discovered of establishing industries within the tropical regions. So long as these regions are unoccupied they are an invitation to invasion as well as a source of strategic weakness. Granted so much, it follows that the supreme justification for the protection of the sugar industry is the part that the industry has contributed, and will, as we hope, continue to contribute to the problems of the settlement and defence of the Northern portion of the Australian continent. The recognition of the nature of this supreme justification is the first condition of a sound public policy in relation to the sugar industry. Relatively to it all other issues are of minor importance.”

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations has received from the Entomologist at Meringa, Mr. E. Jarvis, the following report, under date 14th February, 1923:—

Mortality Among Cane Beetles.

It will be of interest to record that a natural check of more or less severity on the increase of our grey-back cockchafer has been experienced this season as a result of the late spell of dry weather that marked the closing months of 1922. When the cultivation of plantations was resumed during the end of December many cane-growers ploughed up quantities of dead beetles that had been unable to escape from the dry soil. These specimens were probably the offspring of those which emerged at the beginning of November, 1921, the grubs from which—having pupated at an early date (July to August)—produced beetles in their subterranean pupal cells during September last. These specimens would not be able to remain alive underground in dry soil longer than about ten weeks, and consequently must have perished in December, before the dry spell broke up. However, grey-back beetles, as mentioned last month, have appeared in formidable numbers this season; those on the feeding trees at present being no doubt the offspring of specimens which emerged towards the end of December, 1921. If the first rain during this present season had fallen six weeks earlier (beginning of November), we should probably have had a very heavy emergence of grey-back beetles.

Breeding of Scarabæid Grubs.

Incidentally, while studying the imago condition of *albohirtum*, *frenchi*, and other cane beetles, attention this season is being given also to a few related species of root-eating scarabæidæ, the life-cycle of which has never yet been worked out. Although *Anoplostethus latus* or *Calloodes atkinsoni*, for example, are not at present of economic importance, the grubs of these species may quite possibly at some future date make their appearance in cultivated land, or even gradually acquire a liking for roots of sugar-cane.

Para-dichlor. Experiments at Greenhills.

On the 17th instant a plot of Badila cane (August planting) measuring 66 feet by 264 feet was treated with 4-ounce injections of this fumigant, placed 7 inches deep, 1 foot apart, and from 4 to 6 inches from the stools. The work was done with special metal hand-injectors, invented by the writer for the purpose of administering this compound in dry crystalline form, and which were found to meet present requirements—viz., a simple way of burying the fumigant uniformly in a reasonable space of time—pending the subsequent invention of more rapid hand or machine appliances, which, however, would not be needed unless para-dichlor. realises expectations by proving an efficient fumigant.

It may be of interest to mention that the men who were injecting at Greenhills carried the crude crystals in an open 1-gallon tin, suspended at waist level by a strap passing over the shoulder. An occasional whiff from the openly-exposed fumigant gave them no inconvenience, being, in fact, rather pleasant than otherwise; and, moreover, owing to the method of application employed, they had no need to handle the crystals. Since reporting last month on the fall in price of para-dichlor.

to £4 per cwt., the Director has advised me that in all probability a crude form of this compound may be obtainable in the near future at a still lower price—viz., £56 10s. per ton.

Beetles on Feeding Trees (mostly of female sex).

Erroneous ideas with regard to the proportion between the sexes of our so-called grey-back cockchafer (*Lepidoderma albobirtum*) appear to prevail among cane-growers in the Gordonvale District. In order to obtain further reliable data on this question, 86 beetles were collected on the 19th January from fig-trees close to the laboratory, and when examined the results were—55 females, 31 males. Upon dissecting 50 of these females the development of eggs in the ovarian tubes were found to be as follows:—No., 17 beetles, no sign of eggs; No., 2 beetles, eggs had grown to $\frac{1}{2}$ natural size; No., 8 beetles, $\frac{1}{4}$ natural size; No., 4, $\frac{1}{8}$; No., 1, $\frac{1}{8}$; No., 8, $\frac{1}{2}$; No., 1, $\frac{3}{4}$; No., 1, $\frac{3}{4}$; No., 1, $\frac{3}{4}$; No., 3, $\frac{3}{4}$; No., 4 beetles, eggs natural size and fit for exclusion. On the 22nd January an additional 137 grey-back beetles were collected from feeding-trees close to the laboratory, and upon examination we found that 87 of these were females and 50 males. The above data indicates conclusively that collecting beetles from the feeding-trees adjoining headlands of canefields can be profitably carried out throughout the month following any big emergence of these cane beetles.

Tachinid Parasites of Cane Beetles.

An interesting experiment was undertaken this month to determine the percentage of grey-back beetles attacked by Tachinid flies whilst resting in feeding-trees during the day. On the 10th and 11th January 200 specimens were collected at random from trees near the laboratory, and each beetle placed in a cage of moist soil. Up to date (27th January) we have found 31 per cent. of these specimens to harbour dipterous parasites, in one case six Tachinid flies having been obtained from a single beetle. This parasite, which was first bred by us at Gordonvale in 1915, and slightly exceeds a-quarter of an inch in length, resembles in size and general form the common house-fly (*Musca domestica* L.), but is light brownish-yellow in colour, mottled irregularly with pale shades of buff on the thorax and hind edges of abdominal segments. The eyes during lifetime are conspicuous bright red, this colour, however, fading completely to brown an hour or two after death. Other species of Tachinidæ are expected to emerge a few weeks later, and full results in this connection will be reported next month.

Experiments with Aromas for Attracting Cane Beetles.

The possibilities of this fascinating method of control have been discussed by the present writer from time to time in various monthly reports, our first attempts in this direction having been made about eight years ago at Gordonvale Laboratory ("Queensland Agricultural Journal," vol. v., p. 169). As stated last month, evidence of positive chemotropism in *Lepidiota frenchi* Blackb. was obtained last month, details of such occurrence being as follows:—Whilst engaged in putting aromas in various bait traps hung to stakes placed about 200 feet apart on open forest country, the beetles of *frenchi* happened to commence their usual evening flight, which invariably takes place just before the advent of twilight. I was carrying at the time a tray of small bottles, some containing different aromas, while others had been emptied, although a drop or two still lingered around the mouth of these or on the corks, when suddenly, without warning, a dozen or more *frenchi* beetles flew on to the tray, buzzed about the bottles, and even alighted on my fingers, which previously had been wetted whilst pouring solution into traps already set. Although remaining on the tray for about a-quarter of a minute only, this was long enough to indicate that something had attracted them in the first instance. Possibly the movement of the tray as I walked may have caused them to fly off. The aroma in question was perhaps a combination of several different odours arising from the assortment of bottles on the tray, but was probably of a fugitive nature, since no further reaction of these beetles was noticed that evening. Subsequent exposures of aromas on the 1st January afforded additional encouragement, as *frenchi* beetles were found in four of the traps. In one case two females had been attracted, while another trap, containing water in which two chemical ingredients had been dissolved, had caught four beetles, all of the male sex.

The flying season of the beetles is almost over here, although aromas are still being exposed at Riverstone, where the grey-backs are more in evidence. Up to the present (31st January) nearly 100 different aromas have been tried, but none of these have, so far, proved decidedly attractive to adults of *albobirtum*. However, we hope to be more fully equipped for this work next season.

At the present time we are making a special critical examination of the reproductive organs in both sexes of *albobirtum*, which, when studied from a bio-chemical standpoint may afford very material assistance in an investigation of this nature.

SUGAR CROP PROSPECTS.

The Director of Sugar Experiment Stations (Mr. H. T. Easterby), after visiting the Bundaberg and Mackay sugar districts early in February, stated that the continued absence of any regular wet season was giving rise to much uneasiness among farmers generally. Although good rains had fallen in both districts earlier in the year, these had not been followed up with further rains, and the cane, while looking well on the whole, had not made the growth usual at this time of the year. A good deal of the cane in the Bundaberg district was backward and some of it had a distinct yellow appearance. At Bingera the cane was more uniform and had a better appearance than immediately around Bundaberg. The cane on the Sugar Experiment Station at Bundaberg was also well forward.

In the Mackay district the cane was not as far forward as usual at this time of year, although there were some fine patches of cane visible of good growth and colour, there were other areas of some size that were not so well advanced and of a more or less yellow tinge. This appears in many instances to be due to faulty cultivation, and a sufficient endeavour has not been made to conserve moisture by providing a soil mulch with the scarifier. Far too much work has been done with the plough in the young cane, with the result that the capillary tubes in the soil have not been broken, but have been leading moisture to the air, whereby it is dissipated instead of conserved. No doubt farmers expected the wet season would have set in ere now, and its postponement is becoming a matter of some anxiety.

At the Mackay Experiment Station the cane is well forward, but some difficulty has been experienced this year with the green manure crops, owing to the presence of a small grub similar to that which affects the garden bean. This is the first time green manure crops have been so much destroyed as to render them useless for the purpose for which they were planted. These drawbacks appear to exist in the area immediately around the station, but have not been met with in the outside districts.

SUGAR: FIELD REPORTS.

The Director of the Bureau of Sugar Experiment Stations has received the following report (5th February, 1923) from the Southern Field Assistant, Mr. J. C. Murray:—

Woongarra.

The cane in this area now looks remarkably well. Ultimate successful results, however, depend on what rain the farmers receive during the next two months, so that it is much too early as yet to forecast a successful crop or otherwise.

Growers on the whole have their holdings clean, but it will be necessary to persevere as long as a cultivator can be worked in the cane. Shahjahanpur No. 10, M.187, M.1900 Seedling, N.813, and H.Q.285 are all making satisfactory progress. The first-mentioned is showing a remarkably vigorous growth, and, owing to its hardihood under dry weather and frost, should commend itself increasingly to men on medium soils that are inclined to be cold in winter.

Hambledon Queensland 285 is another cane that is giving satisfaction. It is a quick grower and early maturer, although displaying no outstanding resistance to frost like the Shahjahanpur.

Planters are now trying most of the standard fertilisers, but in their own interests they are advised before using them extensively to obtain information from the Sugar Experiment Station as to what results the particular fertiliser would probably give, stating whether their soil is typical of the Woongarra Scrub loams or otherwise; also, as recommended several times previously, to have analyses of soils made for them by the Bureau. Many hundreds of farmers have had this latter work carried out for them with extremely beneficial results. Fertilising is an important phase of sugar-cane culture, so caution should always be exercised in acting upon assurances given by unqualified persons.

Barolin.

The cane on this area also looks well, but the foregoing remarks on the probable Moongarra tonnage also apply here. Cane varieties making growth and presenting a generally healthy appearance are Q.882, Q.813, M.189 (Black Innis), Shahjahanpur No. 10, Malagache, M.1900 Seedling, C.S.R.3, E.K.1, H.Q.285, M.89, C.S.R.4, Q.1098, Q.813. Of these varieties, it is probable that Q.813 and E.K.1 are looking the best, particularly Q.813. Malagache could also be mentioned as having a very pleasing appearance at present. This variety on the whole is a fairly early maturing cane

and showing considerable immunity to the attack of fungoid parasites and bacterial disease. Cane on the Barolin areas appears to be particularly free from disease this year, although discoloration of the leaf frequently appears. Many people confuse this with "striped leaf disease," but with the exception of very tolerant varieties "striped leaf disease" soon develops marked secondary symptoms which materially affect the growth of the cane and leave little doubt as to the nature of the malady.

Bingera.

Cane growth and the crop prospects equal those of Moongarra and Barolin. The farms, generally speaking, look very well, and the owners are hard at work cultivating and preparing for the autumn planting. Some difficulty may be experienced this year in getting sufficient cane plants, as there appears to be more or less a shortage all round.

Cane varieties at present looking well are Q.813, E.K.1, E.K.2, M.189, H.Q.285, D.1135, and M.1900 Seedling. The growers are recommended to experiment with Shahjahanpur No. 10, especially on the forest soils.

The successful results obtained by the plantation management in the use of molasses on ratoons are worthy of comment. About 200 acres have been treated, and the appearance of the cane leaves no room for doubt as to the benefit of the treatment.

Sharon.

There has been an adequate supply of rain in this locality for the present, and the cane looks correspondingly well. Much of this country is a good forest loam, with patches of scrub soil. On the scrub land, the cane probably looks as well as any in the Bundaberg localities. Good crops are showing on the forest soils, also, the ratoons on both classes of soil appear particularly vigorous. A cane that is showing exceptionally fine growth here is the Q.813. Other canes pleasing the growers are E.K.28, E.K.2, M.1900 Seedling, and D.1135. The farmers are recommended to experiment with H.Q.285.

Grubs appear in small numbers, also white ants make minor attacks; but, taking matters altogether, no appreciable loss is occurring. Bonedust as a general fertiliser should give results on these soils, with light dressings of sulphate of ammonia on ratoons in suitable weathers. Subsoiling should give better results than ordinary work on the forest loam at Sharon; also green manures are strongly recommended. When sterile patches occur in the fields, a simple expedient, if it is available, is to tip a load of animal manure on the patch. These sterile or partially sterile pockets occur frequently and spoil the appearance of a farm.

Bucca.

It is probable that Bucca never looked better. Everywhere the cane presents a healthy, clean, and well-tilthed appearance. Cane pests or diseases are not showing in the cane at present; but here, as elsewhere, the farmers are reminded that this satisfactory condition can only be kept up by careful selection of plants in the case of disease and good cultivation mainly in relation to pests, as this makes the cane grow stronger, and it is consequently more resistant to the ravages of borers and grubs.

In all the districts the roads are far below what they should be. Accessibility to the community centre makes life on the land much more attractive. Good roads are vital to the farmer, and, after all, not a big thing to ask for.

The Director of the Bureau of Sugar Experiment Stations has received the following report (13th February, 1923) from the Northern Field Assistant, Mr. E. H. Osborn:—

Invicta Mill, Haughton Valley.

The rainfall on this area amounted to only 39.86 inches, against an average fall of about 45 inches. The December fall of 6.48 inches came just in time, as the conditions then were extremely dry. At the time of my visit the cane was looking very fair and growing at a great rate. For the season just ended some 37,474 tons were crushed, and of this amount about 10,000 tons came from the Burdakin. Although the average c.e.s. figures were lower than last year, some very high individual results were obtained, for instance, 200 tons of 16 months' old plant, B.208, belonging to Messrs. Brooks and Sons, gave an average density of 18.40 c.e.s. Upon inquiring into arsenic experiments for grub control, it was ascertained that four or five growers are so satisfied with their results that they are still using it at the rate of 40 to 50 lb. to the acre. Local farmers have formed a Beetle Board and are now very busy collecting. Four tractors are already in use; many are on order. Tractors are also being used for pumping water.

Herbert River.

Both the local mills finished crushing in very fair time, and put through about 213,000 tons. Although rather on the light side, the season was a very good one, and no industrial trouble of any kind delayed operations. Prior to the 5.84 inches of rain that fell at the end of December, the cane was rather on the backward side, but at the time of my visit the prospects for the coming season were very good. During last year grubs caused a certain amount of damage in the area and a Beetle Board is also doing very good work collecting same. Rats also did a good deal of damage to last year's crops, but the vigorous campaign carried out by the C.S.R. Company was effective. Cultivation methods are improving vastly and a very large acreage is now under lime and green manures. The Herbert River Farmers' League are interested in a proposition to supply a good quality earth lime to growers at about £2 2s. 6d. per ton on the farms. A lime distributor can also be leased at the rate of 1s. per ton by farmers. The League is also supplying manure in large quantities, and in fact is helping the growers in every possible way. Circulars issued by the Association are printed in English and also in Italian. Steps are also being now taken by the League to connect some of the outside areas by telephone. Among the farms visited in the Ingham area was that of Mr. G. Woods (Victoria Estate). This land consists mainly of shallow clayey soil, and when taken up some thirty years ago was considered one of the poorest and wettest upon Victoria, large portions of it being under water for eight or nine months every year. The present owner, of thirty years' standing, has been yearly adding to the splendid system of tile draining, inaugurated by the C.S.R. Company. The pipes or tiles used are made by the local works and vary from 3 to 12 inches in diameter. They have had to be buried at the necessary level to drain the land and are from 1 foot to 11 feet under the ground. After traversing the various fields they empty into main headland drains varying in depth from a few feet to some 10 or 12. It was impossible to get the total length of tiling, but it certainly runs into miles, and as the price of tiles runs from 4d. per foot up to 1s. 6d. per foot for the 12-inch pipe, it is easy to compute the capital represented by the system. Just prior to my visit, some very heavy rain had fallen, but within forty-eight hours scarifying was in full swing. Without drainage weeks would have elapsed before horses could have got upon the ground. As mentioned previously, a large length of the pipes had to be deeply buried, and to cover these up and also level off some low-lying places, vast quantities of soil had to be carted from the open drains—as many as three drays were continually carting from a distance of $\frac{1}{4}$ to $\frac{1}{2}$ mile for a period of over three months. With such thorough draining and good cultivation a farm with only a very few inches of poor clayey soil now has a fair quality soil of a depth of, say, 12 or 14 inches, and capable of growing very payable crops of cane. Mr. Wood ploughs with a tractor drawing a 3-disc plough and ratoons with a double mould board ratooning plough. With the latter he gets through over 4 acres per day, ratooning to a depth of 14 inches. "Bedding up" also forms portion of the work upon this farm, and the beds are graded in a beautifully uniform manner, as the crest of the bed is about 2½ feet higher than the bottom of the water furrow, and comes down very gradually; also, it can be noticed that the cane rows adjoining the water furrow are in nearly all cases superior to the other rows in growth. When it is considered that Mr. Wood has practically reclaimed this land and turned it into a property capable of yielding a couple of thousand tons of cane per annum, he is certainly deserving of great credit.

During a visit paid to Trebonne and the Stone River some very fine cane land was seen, the most noticeable being upon the farm of Messrs. Hardy and Burke, consisting mainly of deep alluvial flats. One 16-acre block of first ratoon Badila cut in October last is now over one's head and should cut at the rate of 45 tons to the acre. Nearby was a block of third ratoon with the trash left. This should run into a 20-ton crop, too. Adjoining this farm is Mr. E. D. Row's. This well-worked farm is all plant and first ratoon, giving generally about 36 tons per acre for plant and about 18 to 20 tons for ratoon. Mr. Row is very keen upon green manure, and has at present some 24 acres under peas, which look a picture. The main canes are H.Q.426, N.G.15 (Badila), H.Q.409, Goru, a small quantity of Black Innis, and canes introduced by the company, such as Nanemo, Korpi, and Oramboo, all of which grow well.

Halifax (Macnade.)

Generally speaking the cane looks very well, but hardly as forward as the Victoria supply. So far, for the month of January the rainfall here has not been equal to that at Ingham. Among the farms visited a fine block of Badila plant was noticed upon Mr. J. Evers's property. This should make a heavy crop for 1923. In this area also several new tractors were seen, but the number has not increased as rapidly here as in some of the other sugar-growing areas in the North.

Rollingstone (Townsville-Ingham Railway).

This area supplies cane to the Invicta Mill, and consists of about fourteen farms. Unfortunately, the rainfall here is rather low, only 47.93 inches being registered for last year against 71.72 inches at Ingham. Several of the growers, however, speak of using tractor power for irrigation where water can be obtained from the river. One grower in a rather large way is Mr. S. Macree. His farm is about three-quarters of a mile from Rollingstone upon the opposite side of the creek, and consists of some very fair deep alluvial soil. He will harvest cane from some 15 acres this year, but hopes to have 65 acres under for 1924. Mr. Macree uses a tractor for ploughing and also intends using it for irrigation. A great deal of work has been carried out upon this farm, such as digging central drains to carry off excess water, and filling in several hollows with scoops. A large stock of manure is being used, and some 1,500 bags of stable manure are also to be used. Further up the line a splendid patch of 10 acres of May plant (Badila and B.208) was seen upon Mr. C. Barney's property. The land consists of heavy scrub land of a very good quality, which should grow magnificent crops.

Goondi.

This mill finished a very successful crushing with a total tonnage of 91,000 tons. The coming season should, however, exceed that total, as the cane at present looks very promising. As a whole, the farms are remarkably clean and free from weeds. A very large proportion of the area is also under green manure, of which some really good crops are to be seen. A good deal of liming has also been carried out, but until the Goondi bridge is finished lime will be an expensive item to this area. Among individual crops seen, some remarkably fine first ratoon Badila cane was noticed upon the Upper Daradgee lands, notably the cane of A. S. Mellick, Joddrell, and Cook, and several others in the near vicinity. These should make very heavy crops. Upon the older lands in the Stockton area some really good third ratoons (Badila), a portion of them with the trash left on, was observed upon Mr. G. Hing's farm. This land has been well limed, green manured, and also had a fair quantity of fertilisers; the result is that the ratoons look far more like good first than third ratoons. Very few cane beetles have been noticed lately. Borers were rather bad last year, but it is to be hoped that the release of the fly by the Government Entomologist (Mr. Jarvis) will help to minimise this pest.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS FOR JANUARY, 1923.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%.	lb.	
Royal Mistress ...	Ayrshire ...	25 Nov., 1922	780	3.8	31.80	
Bellona ...	" ...	30 Aug., "	780	3.8	34.80	
College Meadow Sweet	Friesian ...	18 Sept., "	810	3.5	33.00	
Lady Peggy ...	Ayrshire ...	18 Dec., "	810	3.1	32.40	
Pretty Maid of Haremar	" ...	11 Sept., "	870	3.5	30.60	
College Mignon ...	Jersey ..	20 Nov., "	600	4.3	30.00	
Confidence... ..	Ayrshire ...	13 Aug., "	690	3.7	29.40	
Hedges Nattie ...	Friesian ...	20 May, "	630	4.0	29.40	
Thyra of Myrtleview	Ayrshire ...	22 Aug., "	660	3.7	28.50	
Songstress ...	" ...	4 July, "	600	3.8	26.70	
Dawn of Warragaburra	Jersey ...	17 May, "	480	4.7	26.40	
Yarraview Snowdrop	Guernsey ...	1 Sept., "	450	5.0	26.40	
College La Cigale	Jersey ...	10 July, "	360	5.8	24.60	
Fair Lassie ...	Ayrshire ...	1 Sept., "	480	3.9	21.90	
Netherton Belle ...	" ...	19 July, "	420	4.3	21.00	
Miss Fearless ...	" ...	30 May, "	540	3.3	20.70	
Hedges Dutchmaid	Friesian ...	23 Sept., "	540	3.2	20.10	
College Bluebell ...	Jersey ...	22 Oct., "	360	4.8	20.10	
Miss Betty ...	" ...	15 May, "	360	4.8	20.10	

Rainfall for the Month, 239 points.

STUD STOCK STUDIES.

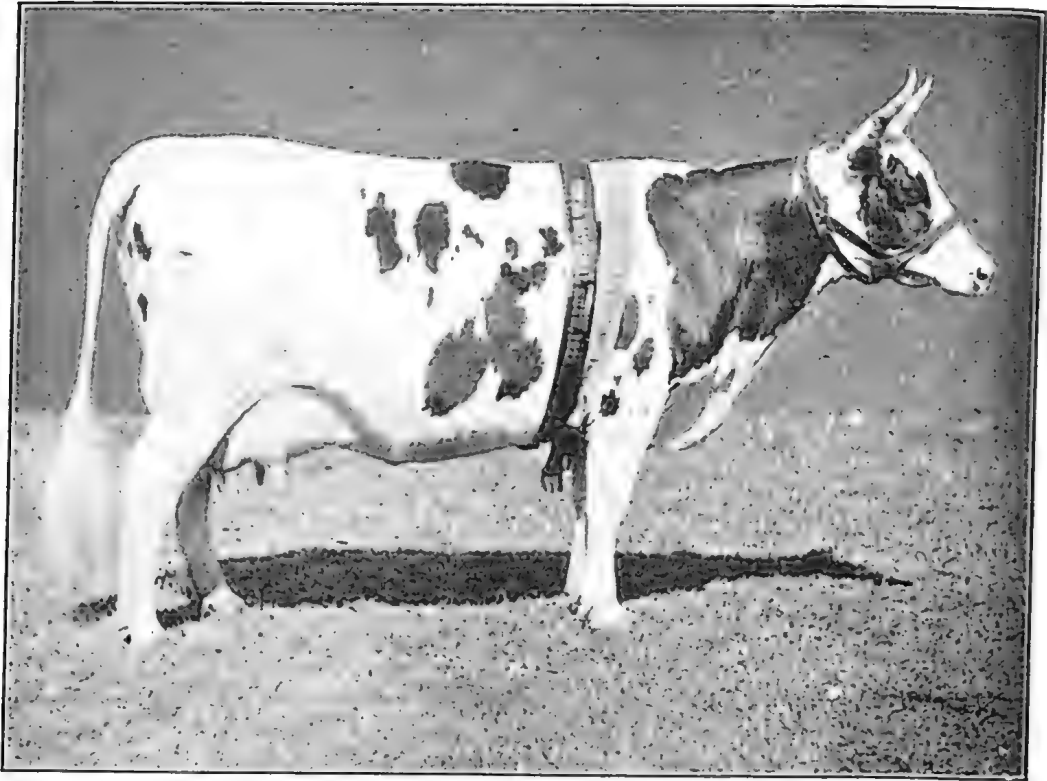


PLATE 46.—BELLE OF LONGLANDS (A.R.Q., 1818).

Champion Ayrshire Cow, Royal National Show, 1922. The property of Mr. Jonas Holmes, Longlands, Pittsworth, Q.



PLATE 47.—A FINE JERSEY TYPE—GINGER FERN OF BROOKLANDS (2470) (A.R.Q.).
The Property of Mr. W. S. Conochie, Tingoorra, Q.

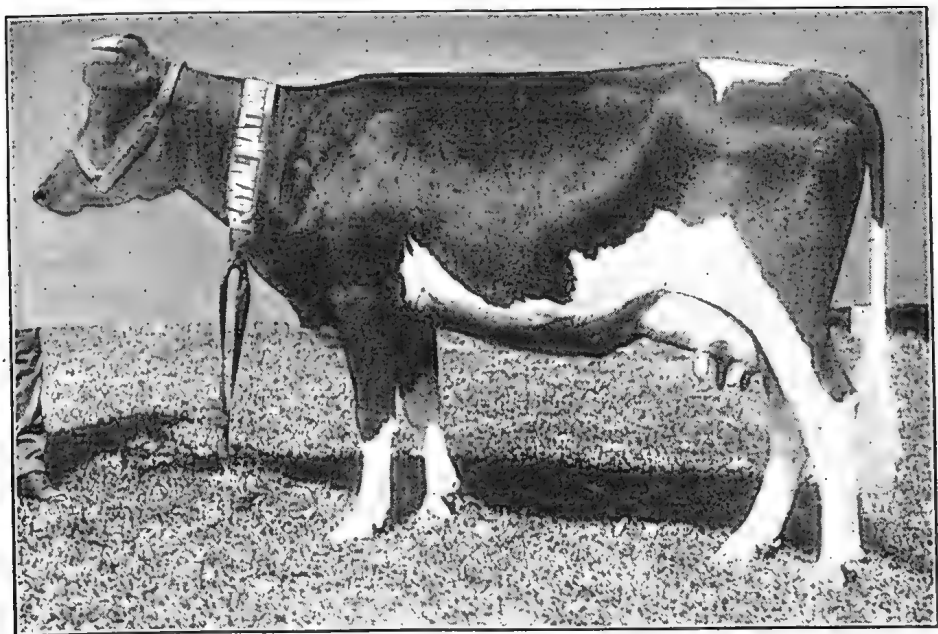


PLATE 48.—A TYPICAL FRIESIAN HEIFER—MAUD ROOKER KORNDYKE (IMP., 589).
By Tsussie Rajah, dam Minnie Rooker Tsussie. The property of Mr. F. G. Brown.

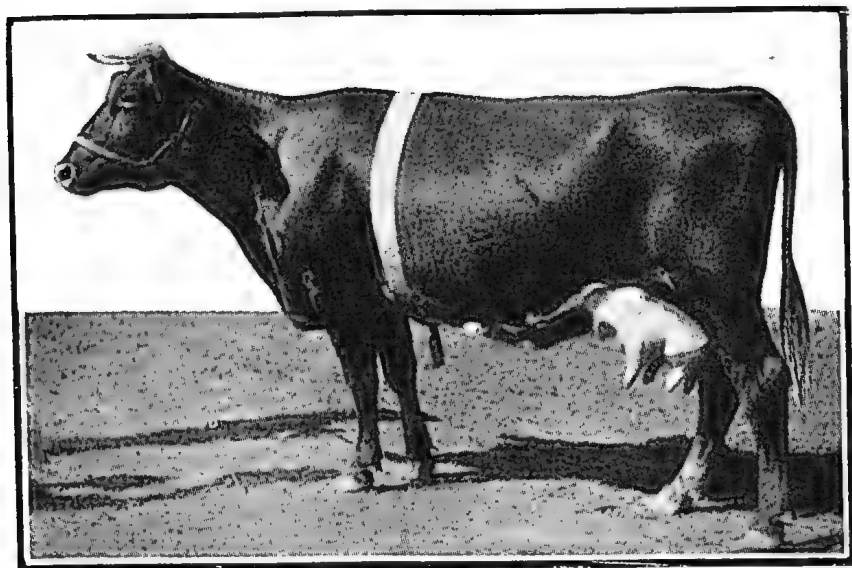


PLATE 49.—A TYPICAL ILLAWARRA MILKING SHORTHORN COW—FUCHSIA
OF STRATHDHU (431).
By Victor 2nd (27), dam Carnation. Bred by and the property of Mr. S. Mitchell, Warwick, Q.

FERTILISERS, MANURES, AND FERTILISERS ACTS.

By J. C. BRÜNNICH, Agricultural Chemist ; and F. F. COLEMAN, Officer in Charge,
Seeds, Fertilisers, and Stock Foods Investigation Branch.

The terms "**manure**" and "**fertiliser**" are often used interchangeably by farmers. If a distinction were made, the word "**manure**" should apply to natural substances, such as farmyard manure or green crops ploughed in for purposes of green manuring, and the term "**fertiliser**" to such artificial products as sulphate of ammonia, superphosphate, and potash salts, which each supply one chief substance required for the nutrition of plants. For the purpose of this article any substance supplying one or more elements used in the nutrition of plants will be termed "**fertiliser**."

The value of any fertiliser depends entirely on the relative amounts of the principal constituents—**nitrogen, phosphoric acid, potash and lime**—contained therein.

For the protection of the farmers and fruitgrowers, Fertilisers Acts are framed, and as our Department found that "The Fertilisers Act of 1914" did not prevent the sale of inferior products, of very varying composition, as fertilisers, the powers under this Act were extended by "The Fertilisers Act Amendment Act of 1916."

The definition of "**Fertiliser**" under the combined Acts is—Any substance or compound containing, in appreciable quantity, nitrogen, phosphoric acid, potash, or lime, manufactured, produced, or prepared in any manner for fertilising the soil or supplying nutriment to plants; also any excrement of animals or any natural substance, or natural product which is used for fertilising the soil or supplying nutriment to plants. The term does not include farmyard manure, stable manure, seaweed, or crude nightsoil, but any other crude product, or offal, whether specially treated or not, is a fertiliser within the meaning of the Acts if sold for the purposes of fertilising the soil.

From this definition it will be seen that such products as **stable and farmyard manure, crude nightsoil, seaweed, tanyard refuse, and boiler ashes**, may be sold as manures, without guarantee of composition.

Every person must obtain a license as a dealer under the Acts before offering any fertiliser for sale. Any farmer or other purchaser may ask the vendor to produce his license, and buyers would do well to confine their orders to dealers licensed under the Fertilisers Acts of Queensland.

As under the present amended Act lime and crude fertilisers are included, any person desiring to sell **lime, limestone screenings, coral sand, sheep manure, bat guano, &c.**, to farmers for fertilising purposes must apply for a license.

The Acts require every licensed dealer to give the buyer an **invoice certificate** and to affix to every package a plainly-printed **label**. It is of the utmost importance that the buyer, not only obtains, but keeps the invoice certificate covering each kind of fertiliser purchased.

In the case of any dispute the production of the Invoice certificate is essential, it being the seller's guarantee of the article sold, and must bear his signature.

An invoice certificate should be in the form prescribed by the Acts, and is required to set out the name of the licensed dealer, the name of the purchaser, the weight purchased, name of fertiliser, including brands or trade mark if such appear on the bags, also the chemical analysis stating the percentage of nitrogen, phosphoric acid, and potash, and the forms in which they respectively occur. In the case of bonedust, bone-meals, and meatworks fertiliser, other than dried blood, the percentage of fine and coarse material should be declared.

On all invoice certificates and labels the amounts of fertilising ingredients have to be stated in a uniform manner, as the old expressions—like bone phosphate, tricalcic phosphate, ammonia, ammonium sulphate, potassium sulphate, &c.—are liable to mislead the farmer. The Act provides for the statement of the valuable fertilising ingredients in percentage amounts of **Nitrogen (N)**, **Potash (K_2O)**, **Phosphoric Acid (P_2O_5)**, **Lime (CaO)**.

In the case of **agricultural lime** the percentage of coarse material and fine material must be stated, together with the percentage of lime as **lime carbonate ($CaCO_3$)**, and in the case of gypsum the percentage of **lime sulphate ($CaSO_4$)**. With burnt lime or quick lime the percentage of **calcium oxide (CaO)** must be declared.

For purposes of explanation we will suppose that W. Buyer, of Cheriton, purchases some meatworks fertiliser from A. Seller, of Summertown, a licensed dealer under the Acts. The vendor, A. Seller, must, on the sale of the fertiliser, whether paid for at the time or not, give to the buyer, at the time of sale or before delivery, an **invoice certificate** signed by the vendor setting out the required particulars. We will assume that the fertiliser in question has been found on analysis to contain 5.5 per cent. of nitrogen in the form of blood, flesh, and bone, 16.2 per cent. total phosphoric acid, and 70 per cent. of the sample is fine, 26 per cent. coarse, 4 per cent. unspecified. The vendor should give the buyer an invoice certificate in the following form:—

“THE FERTILISERS ACTS, 1914 TO 1916.”

Invoice Certificate.

I, **A. Seller, Summertown**, in the State of Queensland, licensed dealer under “*The Fertilisers Acts, 1914 to 1916*,” hereby certify that the fertiliser this day sold by me to **W. Buyer, Cheriton**, being a quantity of **3 tons 4 cwt. 2 qr. 8 lb.**, is known as **Meatworks Fertiliser**, and is marked with the figure, or trade mark, or sign following, that is to say, **M.F.B.S.**”

And I also certify that such fertiliser contains the following ingredients, in the proportion of the whole, set opposite thereto, in the form hereunder:—

Nitrogen,	—	per centum, as sodium nitrate.
Nitrogen,	—	per centum, as ammonium sulphate.
Nitrogen,		{ per centum, as blood.
Nitrogen,	5.5	{ per centum, as flesh and offal.
Nitrogen,		{ per centum, as bone nitrogen.
Nitrogen,	—	per centum, unspecified.
Phosphoric Acid,	—	per centum, as water soluble phosphoric acid.
Phosphoric Acid,	—	per centum, as citrate soluble phosphoric acid.

Phosphoric Acid, — per centum, as citrate insoluble phosphoric acid.
 Phosphoric Acid, **16.2** per centum, total phosphoric acid.
 Potash, — per centum, as potassium sulphate.
 Potash, — per centum, as potassium chloride.
 Potash, — per centum, insoluble and unspecified.
 Fine material, **70** per centum.
 Coarse material, **26** per centum.
 Unspecified, **4** per centum.

In the case of excrement of animals or any natural substance or natural product which is used for fertilising the soil, or supplying nutriment to plants, other than stable manure, seaweed, or crude nightsoil, the average analysis is as under:—

Nitrogen, per centum. Phosphoric acid, per centum. Potash, per centum.

In the case of lime for fertilising purposes:—

(a) Caustic lime, or burnt lime, or quick lime— Calcium oxide (CaO),	per centum.	} Fine material,	per centum.
(b) Mild lime, or air-slaked lime— Hydrate of lime (Ca(OH) ₂),	per centum.		
Lime carbonate (CaCO ₃),	per centum.	} Coarse material,	per centum.
(c) Agricultural lime— Lime carbonate (CaCO ₃),	per centum.		
(d) Gypsum— Lime sulphate (CaSO ₄),	per centum.		

In the case of ashes, or wood ashes:—

Potash, per centum. Phosphoric acid, per centum. Lime
 (CaO), per centum.

Dated at **Summertown**, this **twentieth day of February**, 1923.

(Signature of dealer) **A. SELLER.**

Each bag of fertiliser sold must have attached thereto a plainly-printed label clearly and truly certifying—

- (a) The number of net pounds of fertiliser in the bag;
- (b) The figure, trade mark, or other sign under which the fertiliser is sold;
- (c) The chemical analysis, stating the percentage of nitrogen, phosphoric acid, and potash, and the *forms* in which they respectively occur, and the percentage of fine and coarse material, &c., as required by the invoice certificate.

It will therefore be noted that the only material difference between the invoice certificate and the printed label is that in the former the total weight of the fertiliser is stated, and in the latter the *net* number of pounds in the bag to which the label is attached.

Our buyer should find on each bag of meatworks fertiliser that he purchases from the vendor, Mr. Seller, a label in the following form:—

M.F.B.S.			
MEATWORKS FERTILISER.			
160 lb. net.			
O	Nitrogen	...	5.5 per cent. as blood, flesh, and bone.
	Phosphoric acid	16.2	per cent. total phosphoric acid.
	Fine material	..	70 per cent.
	Coarse material	..	26 per cent.
	Unspecified	...	4 per cent.
A. SELLER, Summertown.			

As the printed label is an important matter to the buyer, specimens of labels for agricultural lime and a mixed fertiliser are given.

AGRICULTURAL LIME.

180 lb. net.

	Lime carbonate	..	..	..	95 per cent.
○	Fine material	..	..	..	50 per cent.
	Coarse material	..	..	..	50 per cent.

A. SELLER, Summertown.

CANE FERTILISER.

180 lb. net.

	Nitrogen	..	..	7.2 per cent. as ammonium sulphate.
○	Phosphoric acid	..	..	7.0 per cent. as water soluble phosphoric acid.
	Potash	..	..	7.4 per cent. as potassium sulphate.

A. SELLER, Summertown.

The monetary manurial value per ton has been fixed for some time under "The Profiteering Prevention Act of 1920." The unit values, which are the cost price of 1 per centum of the various fertilising constituents per ton, or the actual cost value of every 22.4 lb. of such constituent.

The present unit values were fixed by Prices Notifications Nos. 386 and 396, which appeared in the "Government Gazettes" of 7th October, 1922, and 4th November, 1922, and are as follows:—

The maximum price f.o.b. or f.o.r. to any buyer of any fertiliser as specified herein of half-ton lots and over shall be based on registered analysis or certified actual analysis, as under:—

							Unit Value.
Per Unit of Nitrogen (N)—							s. d.
As Nitrate of Soda	..	..	..	..	..	..	30 0
As Ammonium Sulphate	..	..	..	..	..	..	20 0
As dried blood, or blood manure only	..	..	..	..	..	..	24 0
As bone, flesh, blood and offal, fine	..	..	..	..	..	..	24 0
As bone, flesh, blood and offal, coarse	..	..	..	..	..	..	20 0
As bone, flesh, blood and offal, unspecified	..	..	..	..	..	..	17 0
As bone, flesh, blood and offal, unspecified lumps	..	..	..	..	..	..	14 0
Per Unit of Phosphoric Acid (P ₂ O ₅)—							
As Water Soluble in Superphosphate	..	..	..	..	..	..	8 6
As Citrate Soluble in Basic Superphosphate	..	..	..	..	..	..	8 6
As Citrate Soluble in Finely Ground Thomas Phosphate or Basic Slag	..	..	..	..	..	..	8 6
As Citrate Soluble in Finely Ground Mineral or Rock Phosphate	..	..	..	..	..	..	5 6
As Citrate Insoluble in Ground Mineral or Rock Phosphate	..	..	..	..	..	..	4 0
Unspecified	..	..	..	..	..	..	3 0
As Citrate Soluble in Finely Ground Island Phosphate and Guano	..	..	..	..	..	..	5 6
As bone, fine	..	..	..	..	..	..	5 6
As bone, Island Phosphate and Guano, coarse	..	..	..	..	..	..	4 0
As bone, Island Phosphate and Guano, unspecified and unspecified lumps	..	..	..	..	..	..	3 0

Per Unit of Potash (K_2O)—

As Muriate	8	0
As Sulphate	9	6
Unspecified, Water Soluble	7	6
Unspecified, soluble in Hydrochloric Acid	4	3

Per Unit of Lime (CaO)—

As Ground Carbonate (in mixtures only)	1	0
As Sulphate (in mixtures only)	1	3

DEFINITIONS.

“Fine” to signify in the case of—

(a) Thomas phosphate or basic slag, particles smaller than one-hundredth of an inch.

(b) Rock phosphates and guano phosphates, particles smaller than one-fiftieth of an inch.

(c) Bone, flesh, and offal, particles smaller than one-fiftieth of an inch.

“Coarse” to signify particles larger than one-fiftieth of an inch and smaller than one-tenth of an inch.

“Unspecified” to signify particles larger than one-tenth of an inch and smaller than one-half of an inch.

“Unspecified lumps” to signify particles larger than one-half inch.

The “unit value” for all fertilisers applies in an area within a radius of 10 miles from the G.P.O., Brisbane, and for all meatworks products, and guano and island phosphates, or any other natural product, to the areas in which the factory is located or the product is obtained.

For all fertilisers scheduled, the state of fineness must be declared by stating the percentage amounts of “fine,” “coarse,” and “unspecified” particles in the product.

For fertilisers like superphosphates, nitrate of soda, ammonium sulphate, and mixed fertilisers containing any of these fertilisers liable to destroy the bags in short periods, a rebagging charge of 13s. per ton may be allowed, if such rebagging has actually become necessary.

Mixed artificial fertilisers containing superphosphates, and ammonium sulphate or muriate of potash, or both, or for any manure other than basic superphosphate, specially mixed for trade purposes, an extra charge of £1 per ton for mixing may be made, and for basic superphosphate a special mixing charge of thirty shillings (30s.) per ton may be made.

Dealers purchasing from meatworks or bacon factories or Island Phosphate and Guano companies or any other producers, and selling from stock, may charge in half-ton lots or over: 10 per cent. on maximum prices fixed.

Dealers and producers, selling from stock, may charge in lots of 1 cwt. and over, but less than half-ton, 1s. per cwt. extra on maximum prices fixed.

For fertiliser works at and north of Mackay, on account of increased cost of labour and handling, an extra additional charge of five (5) per cent. will be allowed to be made on the calculated total cost.

CALCULATION OF COST OF FERTILISER FROM UNIT VALUES.

From the maximum prices before referred to it will be noted that the unit value of nitrogen as ammonium sulphate is 20s. per unit, water soluble phosphoric acid 8s. 6d. per unit, sulphate of potash 9s. 6d. per unit, and that £1 per ton is allowed for mixing charges. It therefore follows that the price of a **cane fertiliser**, with an analysis of 7.2 per cent. nitrogen as ammonium sulphate, 7 per cent. phosphoric acid (water soluble), and 7.4 per cent. of sulphate of potash, according to previously shown label, would cost, at Brisbane, £14 13s. 10d. per ton.

	£	s.	d.
7.2 per cent. nitrogen, as Ammonium Sulphate, at 20s. ..	7	4	0
7 per cent. of Phosphoric Acid, water soluble, at 8s. 6d. ..	2	19	6
7.4 per cent. Sulphate of Potash, at 9s. 6d.	3	10	4
Mixing charge	1	0	0
Cost per ton at Brisbane	£14	13	10

Buyers would do well to keep in mind that the Fertilisers Acts do not prescribe **standards** for fertilisers. The value of any particular brand or kind can only be calculated on the fertilising constituents guaranteed by the vendor to be present. In particular it is to be noted that, although meatworks and fertilisers of a like nature vary from time to time, they are still sold under the same brand or trade mark, and their actual value per ton may be up or down in accordance with the amount of nitrogen and phosphoric acid that they contain, as declared on the label.

It therefore follows that a buyer should first find what the seller guarantees; a low price per ton does not always mean a cheap fertiliser. The value depends entirely on the percentage of nitrogen, phosphoric acid, and potash that the goods contain. With the help of the list of present unit values, the buyer can get a good idea as to the relative merits of different brands, always taking into consideration the important factor of freight.

WHEN THE BUYER IS IN DOUBT.

Any farmer in doubt as to the quality or any other matter concerning any fertiliser that he has purchased, should at once write to the Department of Agriculture, Brisbane.

Samples under certain conditions laid down by the Regulations under the Acts may be sent to the Department for analysis, the charge for which to a buyer, other than a dealer, is only nominal. In most cases, however, the quickest and best method of deciding any point in connection with a purchase is to write to the Department giving the following particulars:—

Name of fertiliser:	Invoice certificate and label:
Name and address of seller:	Date of delivery:
Quantity purchased:	Name and address of buyer:

All correspondence should be addressed to—

The UNDER SECRETARY,
Department of Agriculture and Stock, Brisbane.

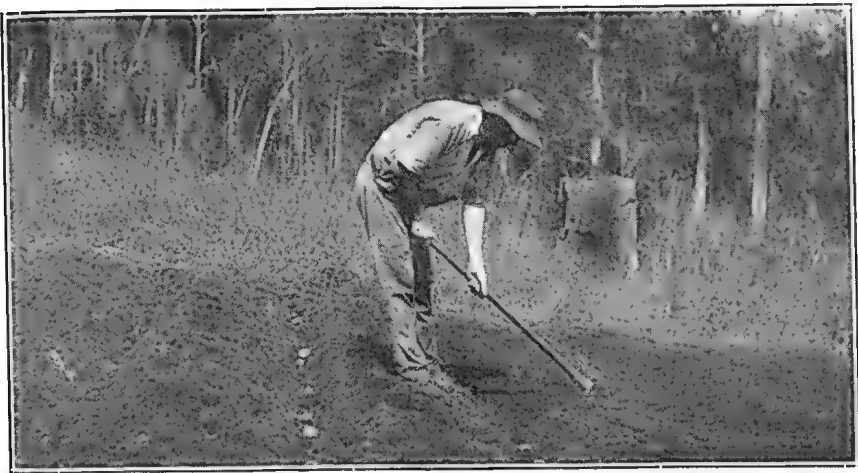


Photo : A. Blakey, Junr.]

PLATE 50.—THE POTATO PLANTER.

THE COTTON WORM* *CHLORIDEA (HELIOTHIS) OBSOLETA*, SAY.

By HENRY TRYON, Entomologist.

INTRODUCTORY.

This cotton pest that the present writer described thirty-four years since as a Queensland destructive insect (vid. Tryon, H. "Insect and Fungus Pests," pp. 190-192, Brisbane, 1889) under the name *Heliothis armiger*,† and as injuriously related to the maize plant, and that was evidently one of the insects much earlier recognised but not definitely identified as an enemy to cotton in Southern Queensland, has this present season manifested its injuriousness in relation to the latter plant over a wide area.

Our earliest intimation of its perniciousness was afforded by the receipt of specimens of the caterpillars from the Toogoolawah district, forwarded therefrom on 28th December. This was soon followed by evidence of its presence in the cotton crop in the Rosewood-Dugandan area. These facts formed the occasion for a special Press report on the subject that was first printed in the "Queensland Times," Ipswich, 17th January, 1923 ("The Cotton Boll Worm—Discoveries in West Moreton"), and that, it is understood, has since been reproduced in other newspapers.

Subsequent to these latter occurrences, the same insect has been brought under our notice as seriously damaging the cotton plant as far west as Chinchilla, in Southern Queensland, in the Cooran, Kilcoy, Woolooga, and Biggenden areas, nearer the coast, and again in the important Central area (Rockhampton). It is unlikely, however, that these indications of local occurrences mark the limit of its range.

Referring to the United States of America, it has been officially stated—"Until the advent of the Mexican Cotton Boll Weevil the Boll Worm was easily the most serious of the numerous insect pests of the cotton plant"—and since already in Queensland its capabilities for occasioning serious loss of crop have been manifested, it is a pest whose presence must be regarded as being of serious significance here also.

The very great attention also that has been bestowed upon this injurious insect will appear from the fact that a bibliography relating to it "largely prepared by Mr. A. A. Girault," and including reference to the commencement of 1905 only, embraced no less than 252 titles, and many additional ones would be required to bring it up to date. This is given in "The Cotton Boll Worm," by A. L. Quaintance and C. T. Brues, Bulletin 50, Bureau of Entomology, U.S. Department of Agriculture, 1905, an elaborate technical Bulletin of 155 pages that we have largely availed ourself of in what follows.

*This insect is quite distinct, both from the point of view of its habits and the nature and extent of its depredations, from the notorious Boll Weevil (*Anthonomus grandis*)—a beetle, and also from the Pink Boll Worm (*Pectinophora gossypiella*), a diminutive moth, both so destructive to cotton in other countries. It is an insect, on the other hand, long familiar to the Queensland farmer as harmful to maize and to the tomato.

†In this article the specific name *obsolata*, Say, has been used for the insect, following American authority. The reasons for substituting this for *armigera*, Hübner, do not, however, appear to me very conclusive. Our cotton pest is the *Chloridea armigera*, Hübner, of Hampson. Vide Catalogue of the Lepidoptera Phalaenæ, IV. Noctuidæ 56, p. 45, London, 1903).

DAMAGE TO COTTON.

The insect is injuriously associated with a large number of plants, some figuring in staple agricultural crops—and in Queensland, especially with Cotton, Maize, Tomatoes, Tobacco, and Peas; but its injuries to the first of these will alone now claim our attention. The fact, however, of this very general dietary is of great significance both in explaining its occurrence as a plant pest and in controlling the same. In fact, it has been stated with regard to the United States occurrence that “the injury to the cotton crop is largely by the third and fourth generations of larvæ” alone. Those of previous generations attack other plants, and in Queensland it is not the first generation caterpillars that are ordinarily associated with the damage.

(a) Injury to Foliage—

This is occasionally manifested when the plants are young and have as yet not commenced to flower; but even after defoliation the plants attacked may completely recover, especially should good growing conditions prevail.

(b) Injury to the Flower Buds or “Squares”—

This is the most serious form of injury, since the “square” attacked almost invariably falls off, even when the injury is very slight indeed. This injury takes the form of a small hole that the caterpillar gnaws into the bud, most commonly through the portion representing the unexpanded corolla; very seldom an additional one is also present. At times, when the flower bud is small, the leaves at the base of the bud (the involucre) are first passed through in gaining access to its interior. These holes may vary in size according to the age of the caterpillar, each boring during its life and growth into and feeding into, on an average, 8 to 9 squares, although a single larvæ has been known to damage as many as eighteen. Meanwhile, the worm commences exercising this peculiar habit two days after it has issued from the egg, and when only about $\frac{1}{8}$ inch in length. It continues doing this throughout its life, whether or not the plant has developed flower buds.

(c) Expanded Flower—

This again may claim the insect’s attentions often to an extent that causes it to fall to pieces.

(d) The Boll—

The bolls again may be attacked. Usually, as buds, flowers, and bolls are present at the same time on a single plant, or succeed one another on any part of it, the caterpillar may bore into these, either after having served to throw down “squares” that it has attacked, or do so exclusively. When a caterpillar has entered a cotton boll, it may thenceforth confine its attention to it until it is full-fed; and not injure one boll and crawl to another to damage it in turn, as happens in the case of the “squares.” Thus, when primarily attacking these the damage may be far less extensive than when the buds are principally claiming its attention. It may be added also that the injury to the cotton boll does not alone consist in the material consumed, for it also renders the admission of mould-fungi and other fungi possible, and so conduces to discoloration and decay of the lint. This secondary damage is more liable to be realised when wet weather prevails. These several injuries may bring about an almost complete loss of crop, as has already been experienced through the attacks of the boll worm in Queensland.

DESCRIPTION OF INSECT.

The caterpillar, it need scarcely be remarked, represents but one stage of four in the life-history of a moth, each of which is characterised by quite distinct outward features and habits of life. These are (a) egg, (b) larva or caterpillar, (c) chrysalis, and (d) adult insect—the moth of both sexes.

The Moth—

This is a stout-bodied insect, measuring about 18 millimetres, $\frac{3}{4}$ inch from head to tail. When settled, the front wings, that almost conceal the hind ones, form a rather wide angle with the body and slightly slope downwards at the sides. These organs when extended together attain 40.4 millimetres, the females usually being somewhat larger. These organs are usually of a general drab-colour sometimes tinted with a reddish suffusion. They have usually an indistinct brown band with a festooned inner margin within their outer (posterior) borders, and a dark discal mark, traversed by a dark line. The hind wings are whitish coloured with the veins and broad apical band almost black. The outer wing margin is also brown, the latter often with a reddish suffusion. The mid-body (thorax) is broad and densely and smoothly clothed with pale greyish-brown hair-like scales. The two sexes are very much alike, but the male has a narrower hind-body.

The Eggs—

These are white objects, apparently almost spherical, but really low dome-shaped with flattened bases. Under the lense they exhibit numerous little ribs radiating from a central spot and united by fine bar-like lines. They are rather less than 1.50 inch in breadth.

The Caterpillar—

This varies at its different stages of growth, is elongated, almost hairless, and three pairs of claw-like bearing true legs, and six pairs of abdominal and one pair of caudal (tail) foot pads (prolegs). In the condition generally observed it is pale brown above, this hue of colour being really produced by a few little longitudinal dark lines, and very pale greyish white beneath; the base and upper surface being separated by a broad yellowish-white band extending the length of the body in which the breathing pores (spiracles) are included. There is also a distinct band, usually double, along the centre of the back. A series of yellow or orange spots also occur along the sides. There are also a series of hair-bearing black points with definite arrangement. The insect usually attains ultimately a length of 42.25 millimetres (21 lines).

A. A. Girault has described six instars or distinct stages of growth, separated each by a casting of the skin (ecdyses). In the first of these succeeding the egg, the caterpillar, at first 1.5 millimetres in length, attains a length of 3.8 millimetres. In the first two of these instars the insect does not exhibit the longitudinal bands later on so conspicuous.

Chrysalis—

The chrysalis is dark-brown and smooth, and presents features in which the body-segments and the folded wings and legs (now both encased) are recognisable. The tail end of the body is elongated and terminates in two spines, one of which is larger than the other—the two almost touching. It measures about $1\frac{1}{4}$ inch in length.

HABITS OF INSECT.

Moth—

The moth flies by night—seldom by day except when disturbed. Then it moves off with suddenness and rapidity to soon alight again and run off to concealment, its colour and colour pattern assisting it then in eluding discovery when settled. Thus disturbed when upon a maize plant, it will usually seek harbourage in another growing close at hand.

It feeds upon the nectar of flowers, including those of the cotton plant itself; again, in that issuing from special glands on the leaf stalks and other part of plants not yet in flower, and also, further, on the sweet fluid excretory matters that emanate from aphides and related insects.

The female and male moths occur in about equal proportion. The full term of the lives of both male and female under natural conditions is to some extent uncertain, but when in confinement, individuals can be kept alive, exercising care, for from seventeen to thirty-eight days, as shown by Girault in the course of his experiments.

Eggs—

Each female moth may lay from 500 to 3,000 eggs, the number being apparently determined by the food secured by it. Observations elsewhere, however, have shown (fortunately) that many of these eggs do not hatch, even when not destroyed by the indwelling presence of some egg-parasite.

When about to lay, an operation that takes place usually soon after sun-down when darkness is coming on, the moth may be observed quickly vibrating its wings in nervous flight as it hovers over some cotton flower-bud, or other portion of the plant, but the while affixing its eggs one by one on the several parts of it, but especially on the former.

Girault noted at different times during a period of eleven months the habits of twenty-four female moths in depositing their eggs. He found that eleven different places were selected for this purpose, nine of which were upon the cotton plant; that, in fact, harboured all but 5 per cent. of those deposited. Also, that of the eight positions on the plant on which the eggs might occur, 28.5 per cent. of the total eggs laid were upon the flower-buds or squares; the foliage (both leaf-surfaces) and bolls being the parts that came next from the point of view of eggs received. Only a few eggs are thus laid indiscriminately here and there on an individual plant.

These facts have an important bearing, since it is only the quite young caterpillars that occur, of course, near the eggs from which they have hatched out that are accessible to practical methods of destruction.

With regard to the length of the egg-stage, the lastmentioned investigator has again shown that this may be of as brief duration as two and a-quarter days, but that, taking an entire season (in U.S.A.), may extend even to seventeen days, but is, generally speaking, nearer the lower limit—i.e., from two and a-half to four days. Further, that this variation is principally governed by that of the temperature to which they are subjected.

Larva or Caterpillar—

On hatching from the egg the boll-worm caterpillar is very small, being only 1.5 mm (1-16 in.) in length, and it is only 3.8 millimetres

when it casts its first skin (first oedysis) and is three and a-half days (about) old. It again grows during life until it is nearly 1 4-5 inch in length and is twenty-one days old.

This development is, however, reached in six different stages (instars), each separated—as is the first—by a molting of the skin and a brief interval of rest. These instars are distinguished, not only by difference in size, but also to a slight extent in general colour and pattern of markings. Thus the caterpillar at first is uniformly pale, translucent, yellowish in certain lights—greenish after feeding, with the head and a plate behind it—the back cervical shield—nearly black.

The minute caterpillar on hatching and after consuming the abandoned egg-shell soon acquires activity and wanders in search of a suitable feeding-place and food. We have found them repeatedly within the growing tips of the plants, amongst immature leaves and flower-buds, for they need tender plant-tissue for their sustenance. As we have seen, it especially seeks out the flower-buds or squares, and having found one very quickly enters within the “leaves” or parts of the involucre that covers and protects this as it develops. Then at once it gnaws a little hole usually into the upper part of the flower-bud that corresponds to the corolla, and starts feeding on the inner parts, stamens, &c., eating these out, and henceforth does the damage we have described to both squares and bolls or to one of these only.

The Chrysalis or Pupa—

When the caterpillar is “full fed” and has arrived at its limit of growth it finds its way to the ground, and soon crawls away from the main stem to a distance not exceeding two or three feet, when it commences to work its way beneath the surface, digging slantingly downwards to a depth of from one to seven inches. Then it works upwards again forming a curved tunnel, with smooth walls of well packed earth webbed together by a thin coating of silk. This brings this ascending branch of the tunnel to one-eighth or one-fourth of an inch below the surface, leaving a thin wall of earth through which the moth must penetrate on emerging. In the lower end of the tunnel, when all this work has been completed, the caterpillar transforms to a chrysalis or pupa.

This stage in the insect's life varies according to the temperature to which the pupa is subject. It may be as short as ten and a-half days, and again may be protracted when the weather is cold to twenty days with an average, say, of fourteen days; but it has been found that the moth does not generally issue at once from the ground, remaining in its cell for sometimes a day or two longer.

Other Food Plants—

Amongst the habits of the Cotton Boll Worm allusion must be made generally to the very large number of plants on which it will subsist and thrive. Messrs. Quaintance and C. T. Brues have enumerated no less than seventy of these, comprised in as many as twenty-two plant families. The principal ones, as we have seen in Queensland,

are, however, Maize, Cotton, Tomato, Tobacco, Cape Gooseberry, Peas, and several garden flowery plants—*e.g.*, Snap Dragon (*Antirrhinum*). In connection with its occurrence on the cotton plant, it is especially necessary to take cognizance of the exact relationship that obtains between it and the maize plant—a matter that cannot be entered upon here, but is alluded to—in a different connection—later on.

The Successive Generations—

The dates of captures of the Cotton Boll Worm Moth at large during the annual season of its activity extending for several months, and consideration of the length of a single life cycle, concur in indicating that there are several successive broods or generations of the insect each year. As far as Queensland is concerned we have no data—derived from observation—whence we can conclude what is the number of these generations. A. A. Girault and F. C. Bishopp, the entomologists who carried out the laboratory investigations in connection with the Cotton Boll Worm in Texas in 1904-5, for the United States Bureau of Entomology, have, however, given us an indirect means of estimating this number. They discovered, in fact, that there was a definite relation between atmospheric temperature and this number in the districts covered by their inquiry. Thus they were lead to assume that in each locality “the average effective temperature required for a single life-cycle within the season of the insects’ activity was 1,417 deg. Fahr., that the activity in spring did not begin until the monthly mean temperature was 10 to 15 deg. Fahr., ceasing in the autumn at the same temperature.” Thus it was calculated that in Florida, where the seasonal activity extended throughout the year and the total effective temperature was 11,058 deg. Fahr., the generations numbered $\frac{11,058}{1,417}$ deg. = 7.9; that in Texas (Paris) the corresponding figures were $\frac{6,892}{1,417}$ deg. = 4.2, and that in New York, it fell to $\frac{2,217}{1,417}$ deg. = 1.5. Moreover, it was discovered that the calculated number of generations (*i.e.*, 7.9, 4.2, and 1.5 and others cited) corresponded to the number of generations reported from direct observation—*e.g.*, Texas 4, Ontario, Canada, 1-2. This fact of the occurrence of successive generations during the season corresponding in time approximately to a certain succession adopted in practice in the growth of crop-plants, and the recognition of a definite life-cycle has had an important bearing in devising, as we shall see, a cultural method for Boll Worm control.

CONTROL MEASURES.

A. Non-Successful Control Measures—

(1) *Poisoning with Arsenical Salts.*—The great success in destroying another cotton caterpillar the “Army Worm” (*Alletia argillacea*), one that does not occur in Australia, by the use of Paris green, has suggested the feasibility of producing similar good results in the case of the Cotton Boll Worm by the application of this chemical or of arsenate of lime, or of arsenate of lead.

But with the Boll Worm (*Chloridea obsoleta*), similarly successful results are, however, not obtainable in practice, since this insect is

for the most part an internal feeder, and so is alone accessible to the poison during the two or three days after it has hatched from the egg, when it is a very small object; a fact that involves for success a very timely application of the poison, or its presence on the plant (that it is difficult to preserve) when this hatching-out takes place. And it may be remarked that when used, it is customary to apply the poison in the dust form—*i.e.*, diluted—instead of with water, with nine or ten times its *bulk* of some powder—*e.g.*, air-slaked lime, or dry but damaged flour.

As regards this question, it may be mentioned that in November, 1921, at a conference of the entomologists of the cotton States of America, at which thirty attended, this general question of the efficacy of thus poisoning the Cotton Boll Worm was fully discussed, and that the conclusion that was arrived at was generally unfavourable to its use. In fact, the Texas entomologist, R. E. MacDonald, stated that in the course of experiments greater damage (through the destruction of predatory insects) took place where arsenical dusting was adopted than where it was not, a statement that was verified by F. C. Bishopp, the entomologist of the United States Department of Agriculture, whilst another entomologist stated that it had taken eight or nine applications to put down an infestation, and that this did not pay.

(2.) *Use of Trap Lights.*—It has been conclusively shown that trap lights that may prove most useful in assisting in the control of another cotton pest of Queensland, the Cut Worm (*Agrotis*), and that also constitute the principal measure used against Cotton Cut Worms in British India, are of little or no avail in controlling the Cotton Boll Worm (*Chloridea (Heliothis) obsoleta*). When they are attracted by light, they settle on surrounding objects and are not, as are many insects, lured to their destruction. Hence, light may prove even a means of increasing their numbers—at least, locally.

B. Successful Control Measures—

(1) *TRAPPING BY USE OF A TRAP CROP.*—In the cotton belt of the United States it is recognised that the Boll Worm Moth, on its first appearance in the spring, does not attack the cotton-plant; and from the dates on which its injuries were reported in our cotton-growing areas the same observation applies to these also. In the former region it is not since cotton-fields are not available, but by reason of the fact that it prefers another food-plant. This favoured plant is the maize, that is usually found growing throughout the States known as cotton States. In fact, it is recognised that the insect that is termed by the maizegrower the "Corn Ear Worm" on the corn-plant drying out in the ordinary course of events, the moths that the Corn Ear Worms have yielded pass to the cotton to lay their eggs thereupon and so infest them. It is thus the third or fourth generations of insects that commence attacks on the cotton, and then only when the growing maize is failing them. And, moreover, the period in the growth of the cotton plant when this event takes place is that in which the flower-buds or "squares" especially favoured by the moth are coming into prominence.

This fact being recognised, a means of controlling the Cotton Boll Worm has been devised, consisting in raising a special growth of the maize so that it will form a trap crop. For this purpose a particular variety of maize is selected that has a rapidly maturing habit as one of its characteristics, and its sowing is so timed that (1) its specially attractive stage (*i.e.*, when it has just finished "silking," or even is a little less advanced and the "silk" is already showing), is attained at the

same time (2) that the cotton is manifesting its flower buds or "squares" and has attained its Boll Worm attractive stage also; and when these events correspond in time to that of (3) the appearance, say, of the third or fourth generation of moths (at the end of a life-cycle of thirty to thirty-five days, as commonly happens), the presence of the more favoured crop—the maize—saves the cotton from being visited by the moths, and so from being Boll Worm infested.

In the practice of this method, every 200 rows of cotton are alternated with five or six rows of maize, or small plots of maize are distributed through the cotton block.

It is further necessary that before the caterpillars, that have developed from the moth's eggs that have been laid on the silk where they are most commonly placed, have reached a stage of growth short of that when they would naturally leave the plant and enter the soil, this maize must be removed, and may be used as ensilage or stover, otherwise it will merely yield a brood of moths to attack the cotton when in boll.

It will appear from this that the successful employment of the trap crop method depends on a precise knowledge of the growth of the two plants, of the relations that subsist between these and the insects, and of the existence of some order in the progress of the season of growth—conditions difficult at present of being met in Queensland.

(2) COTTON CULTURAL PROCEDURES.—1. From what we have stated regarding the habits, it is to be concluded that the moth is less addicted to laying its eggs on individual cotton bolls than on individual cotton squares, and also that if it does lay its egg upon the former much less damage will result than if it deposit in a square in the first instance, since a single caterpillar will restrict its attention to one or two bolls that provide sufficient sustenance to enable it to fully develop; whilst the same insect would pass from one "square" to another, and destroy almost a score of them or not much less.

It, therefore, follows that a measure of control of Boll Worm injury is reached by selecting a quickly maturing cotton, and by cultivating it well and following other agricultural procedures that conduce to its generous and rapid growth, so as to get it beyond its especial vulnerable stage before the moths bent on attacking it appear, and that as we have seen are furnished by other crops earlier sown, and on which the insect also breeds—maize especially, but also tomatoes, Cape gooseberries, &c.

2. Clean cultivation will materially lessen the insects available for subsequently grown cotton, both by bringing about the exposure of them (chrysalises, &c.) to the fatal influence of the sun's heat, in using the implements of tillage, and by rendering them more accessible to the attacks of soil-frequenting predatory beetles, ants, and birds.

3. The avoidance of growing cotton as a ratoon crop, and of the conditions in the field it brings about, especially conduces to a lessening in the numbers of Cotton Boll Worms.

4. For the same reason, the custom of leaving maize standing in the field long after the cobs are ripe conduces to the same harmful result as well as to the presence of other cotton-injurious insects.

(3) PARASITES.—The fact of the insect having a succession of broods during the summer months, of its having—as a caterpillar—so many different food plants, especially amongst those in cultivation and

certain of which—*e.g.*, maize, cotton, tomato, &c.—are more favoured than others, and of its being almost wholly an internal feeder, renders it, as we have seen, almost impracticable to deal with this Boll Worm by the ordinary procedures used in contending with destructive insects generally and that involve the use of insecticides. So, again, the habits of the moth itself render the use of both poison-baits and trap-lights of but little avail, if any. The question under these circumstances—What about the use of parasites?—presents itself.

Now, there are several of these natural enemies of the Boll Worm, including both parasites of the egg and parasites of the larvæ (caterpillars). Thus in the United States of America several in both groups have been met with and described.

(a) *Egg Parasites*.—One of these (*Trichogramma pretiosa*, Riley) has been described as being “extremely abundant and of great value.” This is a small Chalcidid fly, scarcely visible to the naked eye, measuring but 3-10 to 4-10 of a millimetre in length. A. A. Girault, who paid continuous attention to it and its habits during several months, states regarding it that its life-cycle is from eight to eleven days only, the shorter period corresponding to the summer months, also that there may be fifteen continuous generations during this period. Further, that during two years, 1903-4, the proportion of Boll Worm Moth eggs, from different sources, and yielded by three distinct kinds of plants that were parasitised, was practically the same—*i.e.*, rather more than 63 per cent. Further, that more than one *Trichogramma* fly might lay its egg in that of the Cotton Boll Worm Moth. A second egg-parasite, a Proctotrypid fly, has also been met with in the United State of America, but is evidently very rare there.

(b) *Larva-parasites or Caterpillar-parasites*.—These known are of two classes—hymenopterous and dipterous. Of the former (Hymenoptera) is a small, black, red-legged fly, measuring 4 millimetres (2 lines) to 4.5 millimetres (2½ lines) in length, a Braconid fly named *Micropolites nigripennis*, Ashm. The female of this lays a single egg in a partially grown caterpillar, and the resulting grub feeds within and upon it, working its way when full-grown outwards from a point near the head of the caterpillar, when this is only partly grown and is still passing a lingering existence. Having done so, it at once commences to spin up, forming a relatively long cocoon that remains attached to the front part of the caterpillar or to some object near to hand.

The dipterous parasites are various true flies belonging to the family Tachinidæ. Seven different parasites of this group have been bred in the United States alone from the Boll Worm Caterpillar.

(4) *DISEASES*.—There is again a bacterial caterpillar malady that may attack the Boll Worm Caterpillar. It is apparently identical with the disease of this nature that in Queensland is associated with the Army Worm (*Leucania unipuncta*) with such fatal results. These, however, are alone realised when the insects are numerous and the weather is wet or humid.

PARASITES IN CONTROL.—The value of these natural checks on this Cotton Boll Worm, *Chloridea obsoleta*, may be inferred from the following statement that relates to the first-mentioned class only:—

“Summarising the conclusions to be reached from a study of the insect parasites of the Boll Worm, it is evident that the destructiveness of the third and fourth generations is materially lessened by them.

During September, 1904, when the fourth generation should have been damaging much of the late cotton in Northern Texas, it was almost impossible to find any Boll Worms on cotton, and the few to be obtained in the neighbouring alfalfa fields were invariably attacked by parasites. At the same time, adult specimens of *Micropolitis* could almost always be collected in these locations by the use of the sweep net. Meanwhile, the late corn nearby where the parasites could not get at the larvæ was badly damaged. Such evidence plainly suggests that the dearth of larvæ on cotton at this time must have been, in a measure at least, due to the good work of parasites" (Quaintance and Brues).

There is the further significant pronouncement emanating from Hawaii:—

"The Cotton Boll Worm of the Southern States, *Heliothis obsoleta*, has not as yet been found to attack cotton here. It often infests corn, and has occasionally been bred from other plants. Its parasites are so efficient that it is not expected it will become an important factor in our cotton production (D. T. Fullaway, 1909). This latter conclusion has an added interest, since the state of things revealed is evidently one of the outcomes of the extensive transmission on the part of Albert Koebele of parasites of all classes of insects into the Hawaiian Islands from various exotic regions."

With respect to Queensland, and the noteworthy attacks on its cotton crops in many districts by the injurious insect under consideration, we have yet to learn whether insect parasites occur in association with it or not. So far, our only very limited observations have brought to light one of those mentioned, the parasite of the caterpillar itself—the Braconid fly, *Micropolites nigipennis*, or a species closely allied to it. This occurred affecting some Boll Worms obtained by an assistant, Mr. W. A. T. Summerville, near Ipswich, South Queensland.

It is desirable, therefore, that this cotton pest be further looked into from this particular standpoint. Should investigations tend to indicate that already many different kinds of parasites occur affecting the Boll Worm, we may then conclude that the severe injury to cotton is a transient event due to some natural factor prejudicially affecting their numerical development or virility. Should, on the other hand, they reveal their comparative absence, then the expediency—in what has been above stated—will suggest itself, of securing these enemies of *Chloridea obsoleta* that already occur in other countries for the behoof of our cotton-growing industry here, in thus controlling one of the principal of its insectifoes.

(5) PREDATORY INSECTS.—The insect has many predators in its own class. It would unduly extend this article to particularise here. However, it may be mentioned that the caterpillars themselves are inveterate cannibals, and that this fact alone accounts often for marked decrement in their numbers. This is a form of natural control that cannot be practically exploited however.

(6) BIRDS.—The services of birds in controlling the pest cannot be too strongly emphasised, and are most serviceable when the land is being prepared for the crop. This applies both to domestic poultry and indigenous native birds, especially magpies, crows, magpie larks, peewits, and other ground-feeders. Their preservation should be the cotton-growers' special care.

It is a matter for consideration whether the general use in the field of well-stocked travelling poultry-houses, a procedure developed by the present writer in his schemes for subduing the "Grub" (*Scarabæid larva*) of sugar-cane in Queensland, would not prove of inestimable benefit in reducing also the soil-frequenting insects in our cotton-growing areas also—and the insect under notice is, temporarily at least, one of them.—H.T., 5-2-1923.

Description of Plates 51 and 52.

PLATE 51.—*Chloridea obsoleta*, Say (*Heliothis armigera*, Hübner) showing three phases in its life-history—the egg phase omitted. Also showing mode of occurrence of insect, and character of injury to Cotton plant.

PLATE 52.—The same. Showing in further detail the injurious relationship between the Caterpillar ("Worm") and the Cotton Flower—figs. 1-17; ditto Cotton flower-bud ("Square")—figs. 8-13 and 15; and ditto Cotton seed capsule ("Boll")—fig. 21; the general size of the insect as associated with the several injuries effected; and the Eggs magnified—fig. 14.

NOTE.—These Plates are reproduced from the "Fourth Report of the United States Entomological Commission," by Charles V. Riley, Ph.D., Chief, Washington, D.C., 1885.



PLATE 51.—THE BOLL WORM (*Heliothis armigera*.)

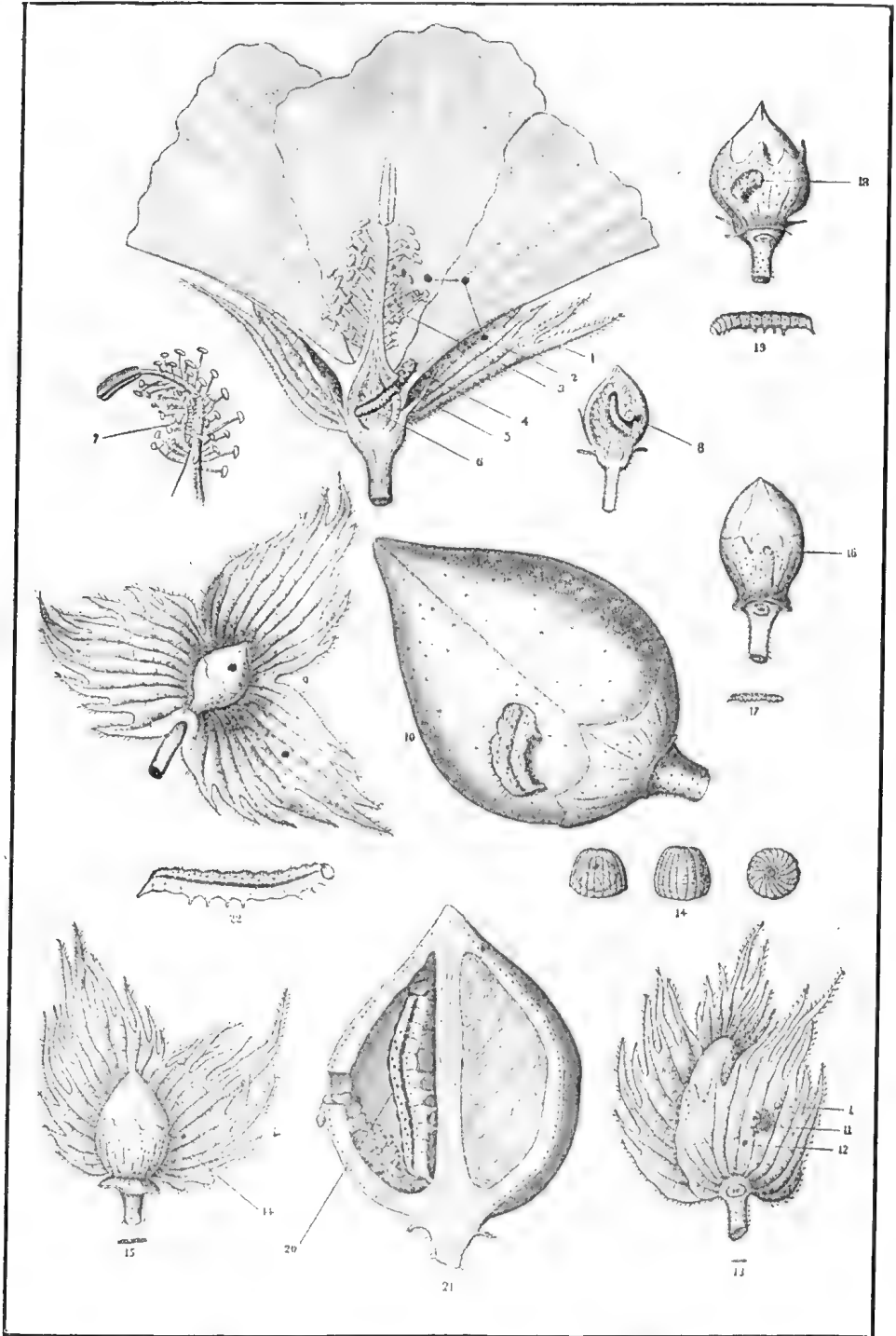


PLATE 52.—THE BOLL WORM (*Heliothis armigera*.)

THE QUEENSLAND COTTON INDUSTRY.

By W. G. WELLS, Cotton Adviser, Department of Agriculture and Stock.

The continued dry spell might nearly be described as a blessing in disguise to the cotton industry, because it has brought out many important facts which seem to have been overlooked in the growing of last season's crop, due in a great measure to the very favourable weather conditions which then existed at the critical period in the growth of the plants. The heavy rains of December and January of last season have confused many people in the formation of their ideas regarding the cotton plant, such as the types of soil best suited to cotton culture, the time and methods of preparing the soil, when to plant, when and how to thin, and the cultivation of the soil after the plants are of sufficient height to allow of it. Owing to the rank growth secured on some of the late-planted crops on very rich soils, many of the growers formed the opinion this year that the poorer classes of soil are the most suitable for cotton-growing. This may be true in localities favoured by heavy and continuous rainfall, where it would be necessary to restrict the growth of the plants; but from observations made this year it does not seem to hold true throughout the cotton sections.

A Southern Soil Survey.

Through most of the southern district, away from the coast, the sandy loams of good fertility and high moisture-carrying possibilities, and the alluvial loams, appear to be well suited to cotton-growing. The heavier soils, while capable of producing good cotton, have been handicapped, not only from the lack of rain during the growing season, but also by the dry winter of last year. Such soils appear to require a thorough saturation of the subsoil before they are capable of carrying a cotton crop to maturity in a season like the present one. Along the coast in average seasons it is probable that the low, well-drained ridges of soils of a loamy nature will give the best results, as there may be danger of too rank a growth being obtained on the richer creek "flats" and soils of that nature during the rainy season. This danger may be overcome by planting at the proper time, and by properly spacing the plants and rows, and it is advised that any grower planting on such land should experiment with time of planting, different widths between the rows, and different distances between the plants, in order to find the proper combination for his soil.

The Soils of the Central District.

Several types of soil appear to be well adapted to cotton-growing in the Central districts, such as the softwood scrubs on both the red and brown soils, the well-drained alluvial soils, and the low ridges of loams and sandy loams. The heavy soils in this district, as in the Southern district, have remarkable moisture-carrying possibilities when the subsoil has been thoroughly wet and good mulches maintained to reduce the evaporation. A thorough mulch is highly desirable on this type of soil, due to its tendency to crack open during the drought.

The Necessity of Thorough Cultivation.

The results obtained by some of the growers this year, even under the severe weather conditions, show the necessity of thorough preparation of the seed-bed before planting. Early ploughing, followed by at least one deep cross-ploughing later on, appears to be highly beneficial, as such a system this year seems to have reduced the amount of weeds and grass and has enabled the rooting system to penetrate deeply in search of moisture, with a consequent ability on the part of the plant to withstand the drought better and also to develop a better crop of bolls containing fibre of good strength and length. Much of the land growing cotton has not been cultivated before, and a thorough aeration of such soils is highly desirable, as they are often of a "sour" nature. It is recommended, wherever possible, to plough at an early date any land which is to be planted to cotton next year. This is especially true of any land being broken for the first time, as it puts the soil in shape to allow a good penetration of any rains which may fall from now on. By thoroughly harrowing after any soaking rains the moisture is conserved, so that the subsoils contain a good degree of moisture and the growths of the weeds and grass are also checked. Later on in the season this land should be cross-ploughed to a depth of at least seven inches, and then be kept in a good state of tilth until planting time. This last ploughing should be done at least a month before planting time in order to allow the soil to settle into a firm seed-bed. In several instances this season it was observed that the seed was being sowed at the time of ploughing. This system should be thoroughly condemned, as it does not allow a thorough preparation of the seed bed, and, when the seeds are dropped in the furrows, it does not allow an average depth of planting.

Seed-Bed Preparation.

Too much attention cannot be paid to the preparation of the seed-bed. The faulty methods of many of the growers of this season are in a great measure responsible for the present condition of the crop. It is true that the drought and insect pests have severely handicapped a good percentage of the crops, but in nearly every section crops have been found which have been grown under a system of thorough preparation of the seed-bed and a maintenance of a clean cultivation after planting. These crops have been badly damaged by the maize grubs in some cases, but without this damage excellent crops would have been produced, even under the droughty conditions existing this year, as is shown by the yields on crops which have escaped the grubs.

By an early and thorough preparation of the seed-bed the grower is in a position to benefit by any good rains in September and to plant during that month, which, from the results obtained this year, seems to be desirable. With a firm, deeply prepared seed-bed, with moisture in the subsoil, any cotton planted after a rain during September is in a position to develop an excellent type of stalk and fruiting system if the proper methods of thinning and cultivation are observed. Many fields of such nature were observed this season, before the December rains came on, which were well laden with bolls and squares, while the neighbouring fields, which had been prepared poorly and planted later, were suffering from lack of moisture and had only a small percentage of the crop which the older and better-prepared fields contained.

Early Planted Crops.

The argument has been advanced that there is the danger of the lower crop of bolls on the early planted crops opening during the rainy season in January, with a consequent chance of their being destroyed by the rains. It is true that along the coast and in some of the more heavy rainfall sections of the inland country there is some danger, during periods of excessive rainfall, that the first few bolls may be mildewed or destroyed by the rains, but there are other factors which should be considered. An early planted plant has a tendency to develop a better fruiting system than later-planted plants, as the fruiting system is being developed in the cooler weather when the growth of the plant is slower, and consequently more fruit is borne on such stocky-type plants than on the faster-developing more slender type of plants of the later plantings. This ability to develop an early crop is highly desirable, even if part of the lower bolls are destroyed, as the crop of bolls acts as a check on too rapid a growth of the plant during any periods of excessive rainfall, which is beneficial, not only in that a type of plant is developed which is more easily picked, but the danger is restricted of such rank growth of plant being developed that any late heavy rains might seriously damage a good portion of the lower crop, due to the inability of the sunlight to penetrate through the heavy foliage and dry out the opened bolls.

Dry Farming Methods.

The impression prevails that cotton is distinctly a dry-weather plant, but, while it resists the drought and heat much better than many agricultural crop plants, it is highly essential that sufficient moisture be obtained at the period when the bolls are developing to the extent that they are utilising a large percentage of the moisture secured by the plant. The present drought has brought out this fact very forcibly, and many of the growers have learned that the best of "dry farming" methods must be employed in order to insure a retention of sufficient moisture in the soil to develop a profitable crop.

The Effects of Close Spacing.

Last year many crops were left unthinned, and the heavy rains which fell during December and January were able to carry the plants to the maturity of a large crop in many cases. This, and the fact that some of the late-planted crops which were spaced a little too wide on very rich soils, and consequently made a very rank growth without much of a crop, led many growers to believe that close-spacing in the row, and in many cases no thinning at all, was highly desirable. Crops treated in such a manner this year are showing the evils of such a system, in that a large percentage of the bolls and flowers has shed during the last month, and that the bolls which have remained on the plant are of small size and in many cases are being forced open prematurely, with a consequent checking of the development of the strength and length of the fibres. The root system of a cotton plant is capable of spreading to only a certain degree, and in periods of drought, such as the present crop is going through, it can be easily seen that the plants should be spaced out sufficiently to allow them to secure the maximum amount of available moisture. This should not be carried out to too great an extreme, as any distance wider than this is simply reducing the amount of the crop under average seasonal conditions. This thinning should be done when the plants are small,

before the competition for the soil moisture has become so severe that the plants are partially checked.

A Difficult Problem.

The yearly fluctuations of the amount of rainfall through most of the cotton sections of Queensland are so great that it is going to be a difficult problem to secure the maximum yields of cotton which the soils may be capable of producing. With this in mind, the grower should study his methods of spacing and thinning, with the idea of producing a good average crop year after year rather than the maximum crop for every year. As is seen this year, the methods last year under good rainfall conditions are failures this year under very droughty conditions. The grower should attempt to perfect a system which will yield a paying crop under droughty conditions and still yield well under very heavy rainfall conditions. This can be accomplished only by the grower adopting the best of farming practices and then experimenting on the average of his soils until he is satisfied of having secured the best system.

Small Areas Tilled Properly Better Than Large Tracts Farmed Badly.

Too little attention has been paid to the cultivation of the crops this year. Many of the growers have had too large an acreage to handle efficiently with the amount of labour at their disposal. It will be far better, both for the grower and the future of the cotton industry in Queensland, if the grower attempts to grow only what he can take care of properly. To many, a cotton boll is just a cotton boll, and it is not realised that even if the boll does look large and well-opened it may contain short weak fibre or long strong fibre, depending on how it is grown. Plants which have been choked out by the weeds and have forced their crop open by the lack of moisture certainly cannot be expected to produce as good fibre as well-grown plants which have had sufficient moisture to develop their crop normally. If faulty methods of cultivation are going to persist, the standard of Queensland cotton cannot be kept up, even with the best of adapted varieties, unless the climatic conditions are exceptionally favourable.

An Encouraging Factor. A Promise of Profitable Yields.

The degree to which the well-grown early planted cotton has stood up this year is very encouraging indeed, and it is anticipated that, when better farming practices are adopted as a whole, the cotton crop of Queensland can be depended on as a profitable industry, even under severe drought conditions. The present crop in good condition in most sections still has sufficient time to develop a surprisingly good yield if the rains start at an early date. If the growers take advantage of these rains and prepare a thorough mulch in any of the crops which are not too high to put the scarifier through, it is anticipated that profitable yields may be secured on the late-planted as well as on the older crops.

REGULATIONS REGARDING COTTON PESTS AND DISEASES IN BRITISH COLONIES AND INDIA.*

In 1910, the Pink Boll Worm was known to exist in India, German East Africa, British West Africa, and Hawaii. In 1922, it was recognised in Egypt and the Sudan, Mesopotamia, Brazil, Peru, Mexico, the United States, and the West Indies. In fact, almost every country growing cotton had been infected with it with the exception perhaps of Turkestan, Uganda, Nyasaland, and South Africa. The spread of the pest was chiefly due to the transport of infected cotton seed often contained in bales of ginned cotton, and has necessitated legislation, which, in nearly every case, has, unfortunately, been effected rather too late to secure freedom from attack.

India—Bombay.

By "*The Destructive Insects and Pests Act of 1914*" the Governor in Council has the power of regulating or prohibiting the import of material likely to carry infection, and on the 7th November, 1917, the Governor in Council issued an order that seeds of cotton should not be imported by land or by sea, by letter or sample post; and again that cotton seed should not be imported by sea except after fumigation with carbon-bisulphide at a prescribed port.

Madras.

By "*The Madras Agricultural Pests and Destruction Act of 1919*" the Governor has directed that all Cambodia cotton plants in certain specified districts shall be pulled completely out of the ground and allowed to wither before the 1st August in

* Summarised from article in Bulletin No. 2, volume 20, page 192, of the Imperial Institute.

each year. The reason for this notification was that the stem weevil and the Pink Boll Worm were established as pests in respect to Cambodia cotton. This effect was brought about by the fact that Cambodia cotton was treated as a biennial and perennial crop, and had thus favoured the spread of the two insect pests which have now become serious. It is therefore proposed to limit the cultivation of this, as well as all other cotton, to a single year, and to arrange for a certain close time during which there will be no cotton-growing.

Burma.

The only regulation affecting cotton pests which is in operation in the country is the Government of India's notification of the 7th November, 1917, by which, under powers of Act of 1914, the Governor in Council issued a general order which is being observed in Burma at the present time, and which deals with the control of imported seed.

Bihar and Orissa.

The importation of cotton seed is controlled.

Assam.

The importation of cotton seed is controlled by regulation, but, as a matter of fact, as the inhabitants use their own seed, they do not import.

Uganda.

The Uganda Cotton Amendment Ordinance of 1920 provides for the following:—
The distribution of cotton seed for sowing purposes shall be under the sole control of the Government.

The Director of Agriculture shall have the power to requisition any cotton seed considered suitable for sowing, and such seed shall be handed over free of all costs.

Cotton seed obtained from hand cotton gins shall forthwith be destroyed unless it is to be subsequently handed over to the Government.

All cotton plants shall be uprooted and destroyed after the first season's crop has been picked, and on no account shall they be allowed to remain for a second season or for more than one year in the ground.

The Director of Agriculture may notify a date prior to which all the previous season's cotton plants must be uprooted and destroyed in any district.

This Ordinance came into force on the 1st January, 1921.

Anglo-Egyptian Sudan.

Ordinance No. 7 of 1907 has reference to locust destruction, a most important regulation where young cotton is liable to be attacked. Where locusts have deposited their eggs in cotton land, the land must be worked with a "fass" as thoroughly as possible without uprooting the plants. The penalties vary from a fine not exceeding £2 or imprisonment not exceeding thirty days, or both, to a fine of £5 or imprisonment up to two months, or both.

By the Plant Diseases Ordinance of 1911 the Governor-General is given powers to proclaim a disease, order the destruction of diseased articles, and quarantine imported plants, and co-operate with the Postal and Customs officials. The diseases proclaimed include the Pink Boll Worm.

Another order published in 1917 prohibits the transportation of cotton seed, seed cotton, cotton lint, cotton plants, and any parts thereof from the Red Sea Province into any other part of the Sudan, except under the authority of the Director of Agriculture.

A further order of 5th December, 1918, prohibits the importation of growing plants into the Sudan, but allows the entry of such plants from Egypt under stringent conditions.

The Cotton Ordinance promulgated in November, 1912, prohibits the importation of cotton seed, except under a permit granted by the Director of Agriculture. No cotton seed may be used for sowing unless it has been approved by the same authority. Cotton shall be picked clean, free from leaves, bolls, and dirt, and none but clean cotton shall be sold or offered for sale. No cotton is to remain on the land longer than the one season. By the Cotton Regulations of 1913, all cotton plants shall be destroyed in certain specified districts before the dates given in each year.

Another paragraph in the regulations compels occupiers of cultivated land in the Tokar Plain to destroy all noxious weeds and other plants likely to harbour pests on their land.

Cotton Regulations published in March, 1917, gave the Director of Agriculture permission to alter the date before which all cotton plants, stalks, bolls, or parts of plants shall be destroyed by the owner. They also regulated the removal or destruction of all waste cotton seed, &c., from a ginning factory likely to harbour the Pink Boll Worm, and made it only permissible to store cotton seed in a ginnery after the ginning has been finished for the season where the doorways, windows, and other openings are covered by wiregauze mesh which will prevent the egress of the moth of the Pink Boll Worm.

The Pink Boll Worm having been found in Tokar cotton seed, it became urgent that steps should be taken to prevent seed cotton or cotton seed grown in the Tokar district from being transported into the other districts, and great care is exercised in this matter.

Nigeria.

Under an Agricultural Ordinance promulgated in 1916 the Governor in Council may make regulations to prevent the introduction or spread of pest, for regulating the sowing, collecting, ginning, or other preparation of cotton, and for prohibiting any importation or the sowing of any particular kind of seed or specifying any particular kind of seed as the only kind to be imported or used.

An Ordinance issued in 1917 provides that all cotton seed must be imported through the port of Lagos, where, after inspection, it may be admitted, disinfected, or destroyed. In 1918, regulations were issued making it an offence to mix American with native cotton.

By a Native Court rule of the Zaria Province of October, 1916, it was made a punishable offence to plant any but Government seed, or to mix cotton grown from Government seed with native cotton. A similar rule was made in July, 1920, in respect to the Court of the Sokoto Province. These rules seem to have little to do with the prevention of pests and fungi, but are practical guarantees that the seed is free from attack and that the crop is reasonably safe.

By a Regulation of 1920 the Governor shall declare what are the American cotton areas in which no other cotton may be cultivated, and, except in such parts of certain provinces as are not declared to be American cotton areas, the owner or occupier of any land in Nigeria on which cotton or any cultivated species of Hibiscus exists shall uproot and burn all plants of either group before certain specified dates.

Gold Coast.

The importation of seed is regulated.

West Indies.

In the Leeward Islands the importation of cotton seed and seed cotton from Antigua is prohibited.

In the Virgin Islands the importation of cotton seed has been prohibited since October, 1920. By a Cotton Ordinance of 1914 cotton plants in Montserrat are not allowed to remain in the soil longer than one season. By the Cotton Stainer Ordinance of August, 1918, all cotton-growers are compelled to destroy the cotton stainer met with in or about any cotton storehouse.

By an Ordinance of 1919 the Governor in Council of Montserrat may declare a close season for cotton in that island, and the occupier of any land in the cotton district must, before the first day of the close season, burn or bury any cotton plants on that land. The planting of cotton is prohibited during the close season.

In St. Kitts and Nevis an Ordinance was passed in 1918 providing for the eradication of cotton stainer. The Governor of St. Kitts is also empowered to fix close seasons. The importation of cotton seed is prohibited, except from certain specified places.

For Antigua, during 1919 and 1920, Ordinances were issued dealing with cotton stainer, close seasons, and prohibiting the importation of seed.

In St. Vincent an Ordinance was issued in 1911 providing for the destruction of old cotton plants and preventing cotton being grown as a biennial plant. In February, 1918, an Ordinance was issued dealing with cotton planted outside the cotton season, and imposing penalties on anyone who planted at any other than the defined period. In 1917, the importation of seed cotton or cotton seed was prohibited, and the prohibition was extended to any bags or packages that had been used for cotton seed or seed cotton.

Nyasaland.

In May, 1920, an Ordinance was issued providing for the destruction of cotton bushes in order to prevent their being grown in more than one season, and which prohibited the distribution to natives of cotton seed which has not been approved by the Director of Agriculture.

Rhodesia.

Cotton seed can only be introduced under the permission of the Director of Agriculture.

Union of South Africa.

By Proclamation of 15th January, 1921, the importation of cotton seed with lint attached and cotton lint in which any cotton seeds are contained is prohibited.

Tanganyika.

Power is given to the Governor to make rules for the inspection of cotton seed and cotton plantations for the eradication of diseases and insect pests. Cotton seed can only be imported under a license obtained from the Director of Agriculture. The Director has power to requisition and distribute seed from any plantation, and no native is allowed to grow cotton from any seed which has not been approved by the Director of Agriculture. Everyone growing cotton shall give notice if he finds disease in his plantation.

No cotton plant is to remain in the ground beyond one year, and the Director of Agriculture may fix a date prior to which all the previous season's cotton plants shall be uprooted and burned. When disease is found to exist in any plantation the Director may order all the cotton plants to be burned, the plantation to be deeply tilled, and no cotton to be replanted for two years.

WEEDS OF QUEENSLAND.

By C. T. WHITE, Government Botanist.

No. 29.

SOLANUM SEAFORTHIANUM.

Description.—A rather slender perennial climbing plant, quite glabrous in all parts. Leaves 3-6 inches long, the upper part deeply 7-9 lobed, the terminal lobe the largest, the lowermost lobes usually very small, the lower part consisting of a slender petiole (stalk). Flowers of a lilac colour, borne in terminal bunches (panicles) of 2-4 inches. Calyx green with 5 short teeth. Corolla when expanded nearly 1 inch in diameter, deeply divided into 5 spreading lobes. Stamens 5, anthers bright yellow. Style slender, pale lilac colour, 4 lines long. Berries bright red (deep scarlet), globose $\frac{1}{2}$ inch in diameter, borne in profusion.

Distribution.—A native of the West Indies and tropical America; of late years it has run out in several localities in Queensland. It is very abundant at Theebine and Kanyan (Wide Bay district), Atherton Tableland (North Queensland), and other places overrunning the "scrub" edges and secondary growths.

Common Name.—It is sometimes called "Deadly Nightshade," a name, however, applied in Queensland indiscriminately to a number of plants of the family *Solanaceae*.

Botanical Name.—*Solanum*, derivation doubtful; *Seaforthianum*, after Lord Seaforth, who introduced the plant into English gardens in 1804.

Poisonous Properties.—A couple of years ago specimens of this plant were sent me from Springsure with the report that two children had seen the plant growing wild and had eaten some of the berries. They were later taken violently ill and were admitted to the Springsure Hospital; both recovered.

The berries are often accused of causing the death of fowls, and in this Journal for April, 1918, an account is given by H. Tryon of the deaths of fowls caused by eating the berries of this plant. (He refers to it as *S. jasminoides* and later as *S. Seaforthianum*—*Seaforthic* by a misprint—and from the description this latter species is evidently the one meant.)

The plant is evidently eaten freely by fruit-eating birds, as can be seen by the way it is carried from one place to another; it is possible that some birds can eat the fruit with impunity. I have heard that ducks eat them freely without ill effects following, but this needs confirmation.

Eradication.—So far it has not manifested itself as a bad weed in cultivation or pastures. It grows freely in scrub areas, and when the scrub is felled may come up thickly enough to prevent a good burn. Growing as it does also on the edges of scrubs, the bright berries are attractive to children, who might eat them with fatal results. In such situations as these spraying with an arsenical solution and later burning the plants should prove effective. It would probably have to be done several times, as additional plants come up after the burning off.

Botanical References.—*Solanum Seaforthianum*, Andr. Bot. Repos. p. 504; *S. prunifolium*, Willd., ex O. Sendtner in Mart. Flora Bras. X 15.

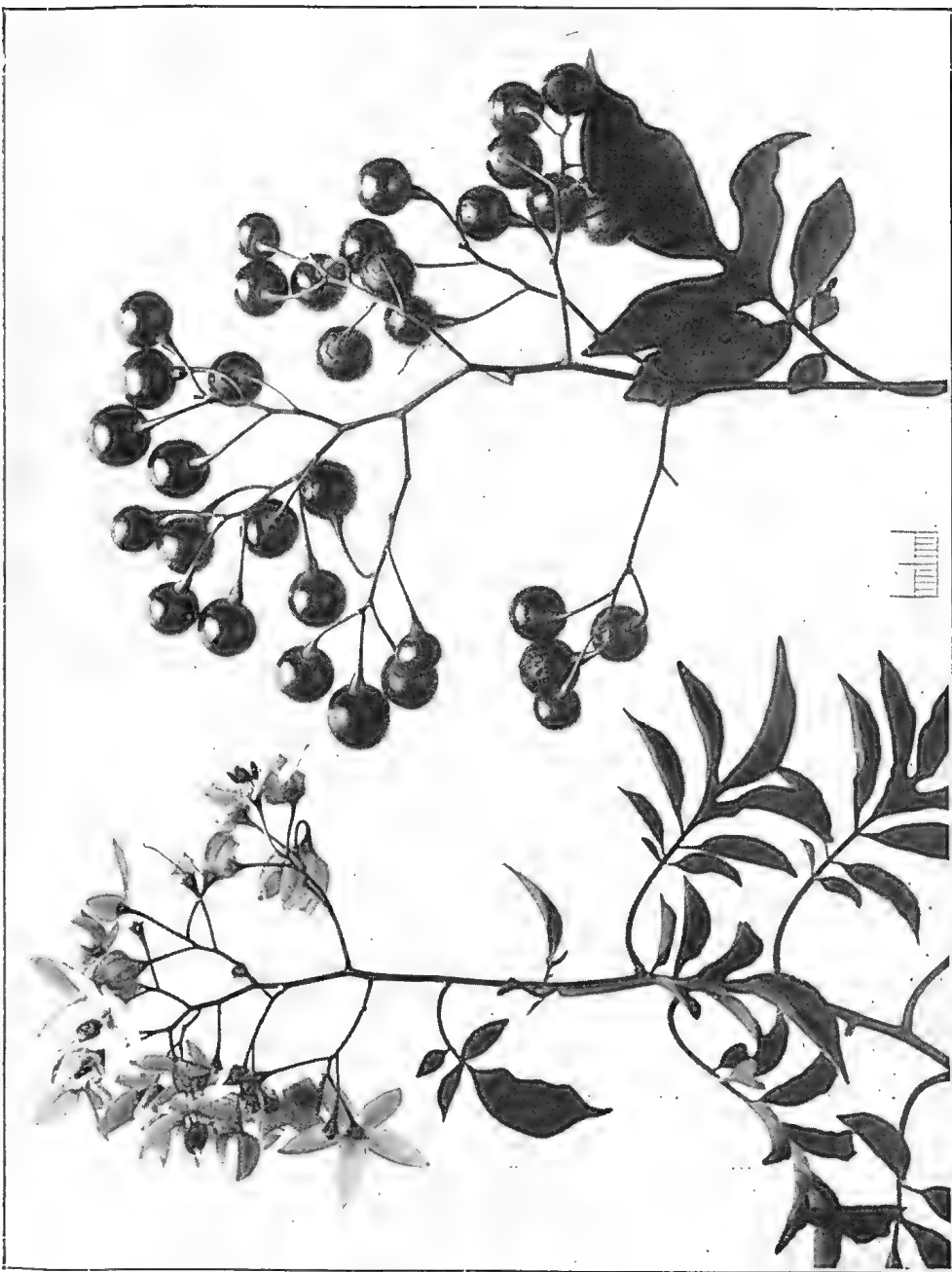


Photo: Dept. Agriculture and Stock.]

PLATE 53.—*SOLANUM SEAORTHIANUM.*

(The measurement at base represents 1 centimetre—nearly $\frac{1}{2}$ inch.)

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, FEBRUARY, 1923.

The weather throughout the month was very hot, and gave to competition birds a trying time. It has had a great effect on the birds that are coming into moult, and with many it also had a tendency to decrease the number of eggs laid during the month causing a great slowing down in their egg production. The following are the leading layers for February:—Light breeds—G. and W. Hindes, 117, followed by C. H. Singer with 116 eggs. In the heavy breeds R. Burns takes the lead with 121 eggs. The following are the individual records:—

Competitors.	Breed.	Feb.	Total.
LIGHT BREEDS.			
*N. A. Singer	White Leghorns	108	1,491
C. H. Singer	Do.	116	1,442
*W. and G. W. Hindes	Do.	117	1,363
*Bathurst Poultry Farm	Do.	103	1,259
*R. Gill	Do.	94	1,227
*S. L. Grenier	Do.	106	1,225
*J. M. Manson	Do.	107	1,215
*H. P. Clarke	Do.	110	1,204
*Mrs. L. Andersen	Do.	104	1,200
*W. Becker	Do.	105	1,200
*G. Trapp	Do.	82	1,197
*J. W. Newton	Do.	96	1,174
*W. A. Wilson	Do.	92	1,163
*G. Williams	Do.	89	1,119
*C. Goos	Do.	81	1,118
J. H. Jones	Do.	72	1,111
*R. C. J. Turner	Do.	96	1,105
*R. C. Cole	Do.	81	1,104
*F. Birchall	Do.	106	1,100
*Oakleigh Poultry Farm	Do.	86	1,100
A. G. C. Wenck	Do.	87	1,092
*O. Goos	Do.	85	1,070
*T. Fanning	Do.	42	1,053
*H. Fraser	Do.	82	1,051
N. J. Nairn	Do.	95	1,038
*Mrs. R. Hodge	Do.	44	1,036
*Thos. Taylor	Do.	100	1,033
*Mrs. E. White	Do.	81	1,022
*M. F. Newberry	Do.	85	1,013
*J. W. Short	Do.	72	1,010
*C. M. Pickering	Do.	81	988
T. H. Craig	Do.	60	984
B. Hawkins	Do.	65	979
*E. A. Smith	Do.	80	966
A. Maslin	Do.	75	960
J. Purnell	Do.	55	936
G. F. Richardson	Do.	76	913
E. Symons	Do.	73	898
H. Trappett	Brown Leghorns	86	898
E. Stephenson	White Leghorns	65	894
B. C. Bartlem	Do.	51	881
A. Anders	Do.	83	862
Brampton Poultry Farm	Do.	68	853
Parisian Poultry Farm	Brown Leghorns	44	574

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Jan.	Total.
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	121	1,361
*A. E. Walters	Do.	72	1,144
*T. Hindley	Do.	69	1,089
*C. C. Dennis	Do.	87	1,080
*R. Holmes	Do.	86	1,054
Jas. Hutton	Do.	83	1,049
*E. F. Dennis	Do.	69	1,041
Mrs. A. Kent	Do.	54	999
*H. M. Chaille	Do.	70	988
Mrs. A. E. Gallagher	Do.	57	985
Mrs. L. Maund	Do.	90	966
R. Innes	Do.	63	959
H. B. Stephens	Do.	92	958
*Jas. Potter	Do.	70	928
*Parisian Poultry Farm	Do.	88	904
V. J. Rye	Do.	82	886
W. Becker	Chinese Langshans ...	60	876
*Rev. A. McAllister	Black Orpingtons ...	71	874
C. Doan	Do.	64	864
Wambo Poultry Farm	Do.	45	862
Jas. Hitchcock	Do.	42	808
C. Rosenthal	Do.	78	805
W. C. Trapp	Do.	61	745
R. Burns	Silver-laced Wyandottes	32	681
*J. E. Smith	Plymouth Rocks ...	51	620
*Miss L. Hart	Rhode Island Reds ...	20	513
Total ... ..	...	5,463	71,160

* Indicates that the pen is being tested singly.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total
LIGHT BREEDS.							
N. A. Singer	218	286	225	260	236	266	1,491
W. and G. W. Hindes	234	219	232	217	238	223	1,363
Bathurst Poultry Farm	170	198	224	220	246	201	1,259
R. Gill	226	219	226	213	153	190	1,227
S. L. Grenier	189	164	212	210	223	227	1,225
J. M. Manson	214	175	204	189	226	207	1,215
H. P. Clarke	199	189	195	218	199	204	1,204
Mrs. L. Andersen	230	171	209	195	208	187	1,200
W. Becker	199	169	207	197	204	224	1,200
Geo. Trapp	206	184	212	220	176	199	1,197
J. W. Newton	207	202	227	185	198	155	1,174
W. A. Wilson	202	183	158	208	200	212	1,163
C. Williams	174	192	210	197	185	161	1,119
C. Goos	138	177	184	202	235	182	1,118
R. C. J. Turner	193	163	202	190	196	161	1,105
R. C. Cole	220	165	206	158	179	176	1,104
F. Birchall	183	209	157	135	218	198	1,100
Oakleigh Poultry Farm	195	160	197	174	177	197	1,100
O. Goos	181	166	193	208	192	130	1,070
T. Fanning	133	172	193	172	235	148	1,053
H. Fraser	179	201	174	151	155	191	1,051

EGG-LAYING COMPETITION—*continued.*DETAILS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
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LIGHT BREEDS—*continued*

Mrs. R. Hodge	207	137	171	155	220	146	1,036
Thos. Taylor	187	145	184	178	177	162	1,033
Mrs. E. White	196	110	214	141	153	208	1,022
M. F. Newberry	174	146	156	218	137	182	1,013
J. W. Short	165	162	191	156	169	167	1,010
C. M. Pickering	197	196	111	161	167	156	988
E. A. Smith	155	157	170	176	140	168	966

HEAVY BREEDS.

R. Burns	220	220	211	252	222	236	1,361
A. E. Walters	188	157	153	196	241	209	1,144
T. Hindley	154	186	120	238	231	160	1,089
C. C. Dennis	183	188	188	161	184	176	1,080
R. Holmes	132	202	187	174	175	184	1,054
E. F. Dennis	150	177	197	110	197	210	1,041
H. M. Chaille	174	167	187	150	191	119	988
J. Potter	158	167	173	144	170	116	928
Parisian Poultry Farm	110	147	177	119	172	179	904
Rev. A. McAllister	158	174	159	107	89	187	874
J. E. Smith	76	118	97	86	106	137	620
Miss L. Hart.. ..	81	109	64	109	74	76	513

CUTHBERT POTTS, Principal.



PLATE 54.—THE STANTHORPE TOMATO POOL BOARD.

Front row : Messrs. S. R. Mitchell, W. H. Passmore (Chairman), W. H. C. Laird.

Back row : Messrs. M. E. Sewell, H. S. Dawkes (Secretary), A. E. Watts, J. S. Mchan (Manager).

NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION COMPETITION, ZILLMERE.

Some extremely hot weather was experienced during February, and there was a falling-off in production, 1635 eggs being laid, an average of 14 per bird. Two deaths occurred, Messrs. Kidd Bros.' No. 86, Black Orpington, died from rupture, and Mr. L. Andersen's No. 19, White Leghorn, succumbed to bowel trouble. Nos. 82, 101, 110, and 112 were broody.

Pen No.	Owner.	Feb.	Total.	Pen No.	Owner.	Feb.	Total.
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WHITE LEGHORNS.

43	J. Davies ...	22	272	58	M. Newberry ...	8	206
29	A. S. Walters ...	18	267	19	L. Andersen ...	0	205
66	A. Cowley ...	21	261	9	P. Ruddick ...	13	204
2	A. Niel ...	1	256	57	M. Newberry ...	15	204
64	G. Trapp ...	21	255	20	L. Andersen ...	19	202
62	H. Sturman ...	20	251	30	A. S. Walters ...	13	200
34	J. Purnell ...	20	250	22	E. Stephenson ...	15	198
7	J. Harrington ...	19	247	73	A. F. Knowles ...	15	195
27	Oakleigh Poultry Farm	17	246	14	J. Hutton ...	18	195
70	A. Hodge ...	20	245	76	A. J. Bourne ...	13	192
53	A. W. Ward ...	21	241	8	J. Harrington ...	8	192
39	P. J. Fallon ...	22	239	36	Parisian Poultry Farm	16	190
25	P. F. Adams ...	17	238	16	T. Flood ...	17	190
63	G. Trapp ...	20	238	80	W. Bliss ...	19	190
13	J. Hutton ...	22	238	78	Kelvin Poultry Farm	20	188
68	R. D. Chapman ...	23	238	17	R. Shaw ...	3	187
79	W. Bliss ...	22	237	6	Wambo Poultry Farm	0	186
77	Kelvin Poultry Farm	17	235	11	J. Potter ...	15	184
61	H. Sturman ...	18	235	81	E. C. Raymond ...	18	184
72	Enroh Pens ...	13	232	5	Wambo Poultry Farm	17	182
12	J. Potter ...	14	232	3	W. Becker ...	18	182
52	F. R. Koch ...	20	232	31	R. H. Woodcock ...	18	181
55	W. H. Lingard ...	20	230	59	C. Pickering ...	22	180
44	J. J. Davies ...	19	229	38	Carinya Poultry Farm	0	179
33	J. Purnell ...	11	224	82	E. C. Raymond ...	6	179
67	R. D. Chapman ...	19	224	48	M. J. Lyons ...	0	176
40	P. Fallon ...	22	224	65	A. Cowley ...	10	175
10	P. Ruddick ...	18	223	15	T. Flood ...	14	166
54	W. Ward ...	19	221	71	Enroh Pens ...	12	163
24	M. H. Campbell ...	19	220	75	A. J. Bourne ...	17	161
46	H. Needs ...	18	219	50	R. Turner ...	14	160
58	M. Newberry ...	21	219	60	C. Pickering ...	10	156
23	M. H. Campbell ...	23	219	45	H. Needs ...	5	155
26	P. F. Adams ...	19	218	4	W. Becker ...	14	152
18	R. Shaw ...	19	211	69	A. Hodge ...	3	135
35	Parisian Poultry Farm	18	210	32	R. H. Woodcock ...	12	128
56	W. H. Lingard ...	19	209	74	A. F. Knowles ...	0	123
49	R. Turner ...	10	209	28	Oakleigh Poultry Farm	0	107
37	Carinya Poultry Farm	20	209	1	A. Niel ...	15	42
47	M. J. Lyons ...	12	208				
41	G. Williams ...	17	208				
51	F. R. Koch ...	18	207				

NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION
COMPETITION, ZILLMERE—*continued.*

Pen No.	Owner.	Feb.	Total.	Pen No.	Owner.	Feb.	Total.
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BLACK ORPINGTONS.

92	C. C. Dennis ...	22	263	86	Kidd Bros. ...	9	179
88	W. A. Blake ...	22	259	112	A. Niel ...	8	178
96	R. A. Boulton ...	10	245	106	H. Pearce ...	14	174
93	E. F. Dennis ...	24	244	104	J. Potter ...	4	173
91	C. C. Dennis ...	22	233	102	Parisian Poultry	0	167
108	E. Walters ...	21	232		Farm		
89	T. Brotherton ...	23	225	109	Wambo Poultry	0	165
107	E. Walters ...	6	215		Farm		
95	R. A. Boulton ...	9	214	83	J. Hutton ...	0	157
111	A. Niel ...	22	212	98	Enroh Pens ...	17	157
105	H. Pearce ...	17	210	97	Enroh Pens ...	17	156
101	Parisian Poultry	9	200	110	Wambo Poultry	13	155
	Farm				Farm		
103	J. Potter ...	10	197	90	T. Brotherton ...	9	151
84	J. Hutton ...	14	187	99	L. J. Pritchard ...	1	131
100	L. J. Pritchard ...	8	184	94	E. F. Dennis ...	0	114
87	W. A. Blake ...	9	183	85	Kidd Bros. ...	0	10

OTHER BREEDS.

120	T. J. Carr (S.W.)	20	209	114	Parisian Poultry	12	166
119	T. J. Carr (S.W.)	21	203		Farm (B.L.)		
116	G. and W. Hindes	15	188	113	Parisian Poultry	3	136
	(B.L.)				Farm (B.L.)		
118	J. H. Jones (W.W.)	0	176	118	J. H. Jones (W.W.)	0	120
115	G. and W. Hindes	22	174				
	(B.L.)						

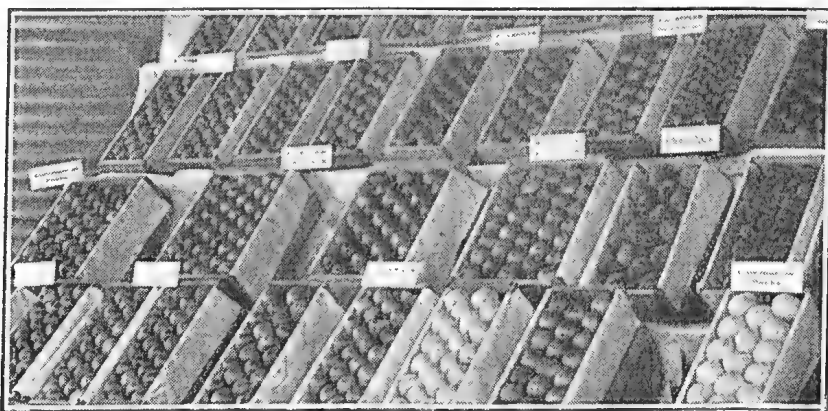


PLATE 55.—SECTION OF DEPARTMENT OF AGRICULTURE'S EXHIBIT AT THE STANTHORPE SHOW.

A valuable lesson in methods of fruit packing.

General Notes.

Regulations Under the Pools Act.

Additional regulations have been promulgated under "*The Primary Products Pools Act of 1922.*" These provide that a Pool Board shall conspicuously display, at least every month in the Board's public office, a full and explicit statement of the Board's receipts and expenditure, stock transactions, and liabilities for the period since the last previous statement was so displayed. At least every year there shall be similarly displayed a full and explicit balance-sheet of the Board. These statements are to remain displayed until they are replaced by their successors, and shall be available for perusal and copying at reasonable hours by any person.

Departmental Appointments.

The following appointments have been made:—

Bessie Wolstenholme as Typiste.

W. A. R. Cowdry as Clerk.

F. B. Coleman as Inspector under the Fertilisers Act, the Pure Seeds Act, and the Stock Foods Act.

W. R. Straughan and O. L. Hassell as Agricultural Field Assistants.

R. G. S. Holt as Assistant to Bacteriologist, Townsville.

L. A. Burgess, Assistant to Analysts.

E. F. Duffy, Inspector under the Diseases in Plants Act.

F. G. Connolly as Assistant Instructor in Fruit Culture.

W. Ford as a Slaughtering and Brands Inspector.

W. C. Stables, of Yeppoon, as an Honorary Inspector under the Diseases in Plants Act.

Constables D. Pope, P. F. McIvor, and T. Caplice as Slaughtering Inspectors.

Constable P. Hogan and F. J. Baker (caretaker of Kirkland's Dip at Kynuna) as Stock Inspectors.

Sergeant Eric Stephenson as an Inspector under the Diseases in Stock Act and the Diseases in Plants Act.

The Nutmeg Pigeon.

The nutmeg pigeon of North Queensland has been added to the list of totally protected birds throughout the State.

State Insurance—Free Household Workers' Compensation Policies.

The Attorney-General (Hon. John Mullan) advises that the experience in connection with Household Workers' Insurance to date has been gone into by the Insurance Commissioner in connection with the preparation of the usual expiry notices to policyholders due to be issued shortly, and it has been found again that, as in the years ended 30th June, 1918, 1919, and 1921, the experience has been so satisfactory regarding this section of the business that expiry notices will be issued to policyholders shortly, stating that policies falling due on 30th June next, will be renewed free of any premium.

The Queensland Mangosteen.

For many years the United States Department of Agriculture sought for specimens of mangosteens with which to carry out cross-breeding experiments. The true mangosteen will not thrive even in subtropical climates, but it is thought that if a cross can be obtained with some varieties, such as are known to flourish on the Bellenden-Ker Range, North Queensland, a subtropical species might be evolved. The species referred to grow at high altitudes where temperatures naturally are much cooler than in plain tropics.

Two varieties are found on the range indicated—*Garcinia Mestonii* and *Garcinia Gibbsæ*. The first-named was discovered by Mr. Archibald Meston, and the latter by Miss L. S. Gibbs, of London.

The Queensland Department of Agriculture has devoted much attention to its native tropical fruits and was in a position to meet promptly the wishes of the United States authorities. The Queensland Government, on learning of the quest, decided to send an expedition to Bellenden-Ker for the purpose of securing seeds and plants for treatment. Mr. Cyril White, F.L.S., Government Botanist, and Mr. E. W. Bick, Curator of the Botanic Gardens, were entrusted with the task. The expedition was successful, and these two officers returned recently with about 400 seeds of each species.

One hundred and fifty of these seeds will be sent to America by the first opportunity. The remainder will be planted under glass in the Botanic Gardens. They will be artificially heated in winter, and when the plants have been sufficiently advanced they will be transported to America in special cases.

This is the first occasion on which the fruit of the *Gibbsæ* species have been collected, for the discoverer of the variety, the habitat of which is the Atherton tableland, contented herself with the flowers.

Messrs. White and Bick, who received valuable assistance from Messrs. Fraser and Merrotsy, forest rangers of the Atherton district, spent five days on Bellenden-Ker Range, finding the coveted fruit at elevations of from 1,500 to over 4,000 feet. The cyclone which swept across that very exposed region in 1918 had obliterated all traces of the old track up the eastern slope of the range, but the forest rangers had prepared another track, and personally conducted the botanists over the route. The weather proved delightfully fine, until the last day of their stay, when heavy rain drenched them. The nights were quite chilly.

Naturally this little-explored region proved a most interesting place to the botanists, who, while in special pursuit of mangosteens, kept their eyes widely open for any other rare specimens of plants. A number of these were secured, especially of the palm family, and it is believed that one or two species new to science have been obtained. These will be more closely examined and reported on in due course.

The mangosteen, contrary to its name, is not at all like a mango. It has the appearance of a green tomato, both in size and shape, and has a strongly acrid taste. So pronounced is this flavour in the case of the *Gibbsæ* species that even the hungry wild natives exclude it from their dietary.

Diseases in Plants—New Regulations.

Three new regulations have been added to the existing regulations under "*The Diseases in Plants Act of 1916*," whilst clauses 26-34 of the regulations dated the 12th January, 1917, and regulation No. 51 have been repealed. The new regulations number from 52 to 54.

Regulation 52 stipulates that no owner (or his agent) of an orchard shall permit any fruit, whether diseased or not, to be on the ground. He is required to gather all fruit that may drop to the ground and destroy such of that fruit that may be diseased by submitting it to the process of boiling, or as otherwise instructed by an inspector under this Act.

Regulation 53 deals with the codlin moth of pip fruit, and requires that orchards in which codlin moth is present shall be sprayed with an approved brand of arsenate of lead. The first spraying is to be given when the petals are falling from the flowers, and, if deemed necessary, a second and third spraying shall be given at intervals not exceeding three weeks from the time of the first application.

The first regulation also deals with the codlin moth and imposes upon the orchardist growing apple, pear, and quince trees the duty of keeping his orchard free from dead bark, broken limbs, props, or any other material likely to harbour the larvæ or pupæ of the codlin moth.

Australia's World Champion Butter Cow.

Australia now holds the world's record for the butter-fat production of a single cow, Melba XV. of Darbalara, a milking shorthorn, having produced 1,318-812 lb. of fat, equal to 1,586½ lb. of commercial butter, in 365 days. Her milk yield was 29,432 lb. This figure has been exceeded by several Friesian cows, but none of these has come within 60 lb. of Melba XV.'s butter production.

The Pineapple Crop—Ex-Soldiers' Distribution Scheme.

The soldier growers at Glass House Mountains are endeavouring to work out their own salvation. Their organisation, the United Fruit Growers' Association, has launched a distribution scheme by means of which they hope to place the greater part of their crop on the fresh fruit market at a price that will be fair to grower and consumer.

Every case of pineapples diverted from the canneries and sold as fresh fruit increases the return to the grower. It is obvious that a departure must be made from the obsolete marketing methods at present in vogue.

The growers of Glass House Mountains are translating the slogan of "direct from grower to consumer," into an accomplished fact. Cases of choice pineapples, 16 to 24 to the case, are being delivered to any address in Brisbane or suburbs for 6s., cases to be returned. Orders with cash are being received at the State Trade Office, Treasury Buildings, the Central Station Café, and the State fish shops, Valley and Victoria Bridge. Under this system, overhead charges are reduced to a minimum, and agents and retailers' profits eliminated. The consumer buys cheap fruit and the grower receives a fair return for his labour. Every possible care is taken to ensure the fruit arriving in a satisfactory condition. Only choice pines are marketed; cases are packed with straw to prevent bruising, and recipes for wine and jam making are enclosed in each case.

The mail order branch is already in full swing, orders coming from such distant places as Mount Morgan, Blair Athol, and Cunnamulla. The Glass House Mountains growers are appealing to the community generally for assistance in winning a livelihood on the land. Business men, employers of labour, and departmental heads can help by bringing the matter before the notice of their employees.

Direct Distribution.

In connection with the Glass House Mountains soldier growers' scheme of direct distribution from grower to consumer, the Trade Commissioner (Mr. W. H. Austin) advises that so far the response from the country has been very satisfactory. Quite a large number of other producers have decided to assist these growers and are making regular weekly purchases of pineapples while the crop lasts. Fruit also is going forward to the Mount Morgan miners and to the men on the Mundubbera railway extension. At the Ipswich workshops the employees have responded nobly. In the first week six cases were sent up to Ipswich on trial, the second week 30 cases were ordered, the third week 60 cases, and for the fourth week 120 cases were ordered.

Nodules in Beef—Successful Experiment.

Trial shipments of frozen beef under the new method of dealing with nodules, sent to London last year by Messrs. Borthwick and Co., and the Australian Meat Export Co., are the subject of a report dated 22nd December last, which the Premier (Hon. E. G. Theodore) has received from the Agent-General in London (Hon. J. A. Fihelly).

The report is prefaced by the following cablegram which Mr. Fihelly sent to Mr. Theodore on 20th December last: "Borthwicks and American companies' trial shipments under new method dealing with nodule most successful. Carcasses show great improvements and quite attractive. Port of London health authorities inspected this morning and seem favourable. Will cable their decision later when report to hand."

"It has long been recognised," states Mr. Fihelly, "that the disfigurement to hindquarters of Queensland beef caused by the search for and removal of nodules has affected their sale to some extent. Considerable interest was therefore evinced by the meat trade here in some shipments recently made by Borthwicks and Swifts of hinds dressed in such a manner as to cover the effects of the operation referred to. This has been done by lifting the skin from the portion affected before the meat was cut and carefully replacing it after the nodules had been removed. By this method the general appearance of the meat is undoubtedly rendered much more attractive, and the only thing to be considered now in connection with the experiment is whether the health authorities at the various ports have any objection to it.

"With the view of testing this point, shipments of 100 hinds have been made by Borthwicks to London, Liverpool, and Hull. The London consignment was unloaded from the Moreton Bay on the 19th instant, and on the 20th a number of the carcasses

were displayed by Messrs. Borthwick on their stall at the Central Meat Market, when, in addition to representatives of the meat trade and myself, the principal medical officer and other medical officers of health for the Port of London were invited to inspect them.

"The meat people were generally favourably impressed, and so far as could be gathered, the medical men approved of the arrangement provided that adequate guarantees are forthcoming that the work of removing the nodules is carried out as efficiently as heretofore. They have not yet, however, given their official decision in the matter, and it is possible that this may be withheld until the views of the medical officers of health at Liverpool and Hull have been obtained as a result of their inspection of the consignments above referred to made to their respective ports."

Pear Poison—State Arsenic Supplies.

In the course of a recent Press interview, the Minister for Mines (Hon. A. J. Jones) recalled that the mine and treatment works were established about five years ago for the express purpose of providing the shire councils and landholders who had prickly-pear on their holdings with arsenic for pear eradication at a low price. Immediately the Mines Department was ready to supply, the Cabinet decided to sell arsenic for pear destruction purposes at £10 per ton delivered at the nearest railway station. At that time the market price ruling was from £70 to £90 per ton. The Lands Department paid the Mines Department the difference between the cost of production and the £10 per ton, therefore the concession to farmers, rightly belonged to the Lands Department. "It must be remembered," he added, "that the prickly-pear pest is a legacy handed down to this Government, and its destruction has now become a national question. At the same time, I am satisfied that the statement that pear is spreading at the rate of 1,000,000 acres a year is an exaggeration. However, it needs attention, and the Government recognises its obligation; the mine and arsenic works was established and is now the basis of pear destruction in the State."

"Hundreds of tons of State arsenic have been put into pear poison and sold direct at the cheap rate mentioned," Mr. Jones said, "and as a ton of arsenic kills many acres of growth, the State arsenic mine has contributed largely towards pear eradication, and has done much to keep it in check. However, the arsenic supplied at the absurdly low price of £10 per ton has not accomplished as much as I expected, for the reason that, arsenic not being soluble in water, the poison has to be mixed with other ingredients, and to give the best results the solution must be of certain strength—not too strong nor too weak. Its application to the pear is almost scientific and requires experience. Only recently one of our purchasers of arsenic at £10 per ton condemned the product of the State, although it was accompanied by a certificate from the Government analyst, and he paid £2 2s. for an analysis from the agricultural chemist, with the result that he had 96 per cent. grade. The difficulty was that he did not understand the mixing, which really is a scientific problem, and, in my opinion, for various reasons should not be left in the hands of the farmers. What is wanted is the supply direct to the farmers of a concentrated preparation in a powdered form of the poison which can be mixed with water.

"At present," Mr. Jones continued, "the manufacturers of arsenious pear poison place it on the market in liquid form, which again has to be mixed with water on the farm, and the price the farmer has to pay is out of all proportion to the value he receives. For instance, one line which is sold at 3s. 6d. per gallon contains less than 6d. in value, including the arsenic. We could manufacture this formula and place it profitably with the user at 1s. 3d. per gallon, allowing £50 per ton for the arsenic. The advantage of a concentrated poison in powdered form is in mixing, cost of transit by rail and cost of packing, and moreover it is less dangerous.

"The State mine at Jibbinbar is capable of producing all the arsenic used at present in Australia, although it is being brought into use recently for new purposes. Recently we supplied the South Australian Government with 62 tons of arsenic, which is used on their railway lines to check the growth of weeds and grass. The Queensland Railway Department is also supplied by us for that purpose. Although we have not refused an order during last year for pear destruction, by the end of the year we had accumulated 200 tons of arsenic. That has since been sold, chiefly in the South, and some for export to America, where there is a demand at present. To-day our orders exceed the quantity produced, but the orders received are mostly for export purposes, and we only sell our surplus after supplying the needs of the prickly-pear farmers and the manufacturers in our own

State. Arsenical poison is the most economical method of eradicating prickly-pear at the present time, and while much is to be hoped for from the research work of Professor Johnstone and others for a parasitical remedy, yet during the progress of this good work the pear is growing and spreading over many miles of good land adjacent to our railways, which, if cleared, would be producing and contributing revenue to the Railway Department. The State arsenic mine is the basis of pear destruction in this State."

Silage Stacking.

Advice and instruction respecting the making and stacking of silage is being given in the country by expert officers of the Department of Agriculture and Stock. At present Mr. C. S. Clydesdale (Assistant Instructor in Agriculture) is visiting the Canungra area, where he is giving demonstrations. Mr. S. M. Smith (field assistant) is in the Boonah district, where he is giving information relative to the stacking of maize and other material for silage purposes.



PLATE 56.—A STRIKING FEATURE OF THE RECENT SUCCESSFUL CHEESE "DRIVE."
A Queen-street Window Display.

Cotton Pests.

Referring to cotton pests, Mr. Atkins, the expert attached to the Cotton Growing Association, said that a representative of a firm carried out a liquid spray test under the auspices of the association. The solution used was thoroughly effective in killing the smaller grubs on contact without injuring the plant. Although the cost of treatment is fairly low, the association is not yet satisfied that the results will justify the labour involved in spraying. In a few days it is hoped to place on the market some kind of smoke balls, which will enable a field to be thoroughly fumigated by a sulphurous smoke cloud, which would rid it of all insect life at a very low cost. The grub seems to be identical with those found on other crops in the days before cotton was introduced, and it is possible an increase in their numbers has been brought about as a result of the drought-resisting properties of the cotton crop, combined with the dry season. There seems to be a noticeable decrease in the amount of damage which has been done during the past few days. Reports from the Dawson Valley point out that the damage being done by pests is now on the wane.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JANUARY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JANUARY, 1923 AND 1922 FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Jan.	No. of Years' Records.	Jan., 1923.	Jan., 1922.		Jan.	No. of Years' Records.	Jan., 1923.	Jan., 1922.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
	In.		In.	In.		In.		In.	In.
Atherton ...	12.20	21	6.99	8.27	Nambour ...	9.46	26	5.99	4.39
Cairns ...	16.95	40	3.81	6.05	Nanango ...	4.55	40	3.38	3.22
Cardwell ...	17.21	50	4.31	3.92	Rockhampton ...	9.12	35	5.49	4.36
Cooktown ...	15.16	46	7.46	8.08	Woodford ...	7.47	35	4.31	3.49
Herberton ...	9.74	35	5.35	6.86	<i>Darling Downs.</i>				
Ingham ...	16.73	30	6.46	3.15	Dalby ...	3.32	52	3.37	3.09
Innisfail ...	20.95	41	11.37	6.03	Emu Vale ...	3.13	26	3.15	1.24
Mossman ...	18.37	14	7.61	9.25	Jimbour ...	3.78	34	1.18	1.48
Townsville ...	11.78	51	1.14	5.23	Miles ...	3.88	37	2.48	2.77
<i>Central Coast.</i>					Stanthorpe ...	3.55	49	2.80	1.20
Ayr ...	12.25	35	0.32	6.55	Toowoomba ...	4.95	50	2.91	2.28
Bowen ...	10.48	51	0.91	5.12	Warwick ...	3.51	57	3.29	1.29
Charters Towers ...	5.86	40	6.28	2.26	<i>Maranoa.</i>				
Mackay ...	15.33	51	8.65	4.78	Roma ...	3.40	48	2.28	3.59
Proserpine ...	18.22	19	4.26	3.12	<i>State Farms, &c.</i>				
St. Lawrence ...	10.19	51	6.22	2.05	Bungeworgorai ...	2.20	8	2.33	2.41
<i>South Coast.</i>					Gatton College ...	4.28	23	2.39	2.39
Biggenden ...	5.46	23	5.59	4.04	Gindie ...	4.00	23	1.85	3.91
Bundaberg ...	9.21	39	8.22	7.54	Hermitage ...	2.90	16	3.28	1.40
Brisbane ...	6.37	72	2.79	3.62	Kairi ...	8.35	8	4.65	...
Childers ...	7.94	27	4.44	6.13	Sugar Experiment Station, Mackay	16.96	25	5.95	3.71
Crohamhurst ...	12.56	30	4.56	7.26	Warren ...	6.89	8	3.59	2.44
Esk ...	5.61	35	1.95	2.88					
Gayndah ...	4.83	51	3.56	2.13					
Gympie ...	6.80	52	5.70	2.83					
Glasshouse Mts. ...	9.12	14	3.30	4.67					
Kilkivan ...	5.79	43	2.64	1.14					
Maryborough ...	7.43	51	5.17	3.14					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for January, 1923, and for the same period of 1922, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
State Meteorologist.

Orchard Notes for April.

THE COAST DISTRICTS.

In the orchard notes for March the attention of citrus growers was called to the necessity of their taking the greatest possible care in the gathering, handling, sweating, grading, and packing of the coming crop of fruit, as the returns for the labour expended in the upkeep of their orchards will depend entirely on the condition in which the fruit reaches the market. Many growers fail to realise the very important fact that the success of fruitgrowing does not depend merely on the proper working and management of the orchard, so essential for the production of a good crop of high-class fruit, but that the manner in which the fruit is handled and placed on the market is of even greater importance. In no branch of fruit culture is this more evident than in the case of citrus fruits, as no fruit pays better for the extra care and attention necessary to enable it to be marketed in the best possible condition. Every season there is more or less loss in the consignments sent to the Southern markets, the percentage depending mainly on the weather conditions, the loss in a wet year being much heavier than that in a dry year.

A very large percentage of the loss is due to what is known in the trade as specking—viz., a rotting of the fruit caused by a mould fungus, and this loss can be prevented, provided necessary precautions are taken. Although this matter was dealt with last month, it is of such vital importance to our citrus growers that it is necessary to again refer to it.

In the first place, growers must clearly understand that specking cannot occur on perfect fruit, the skin of which is free from injury of any kind. The fungus causing specking can only obtain an entry into the fruit through an injury to the skin; it will thus be seen that the remedy for specking is to take every possible care not to injure the skin of the fruit in any way.

Few growers realise how easily the skin of citrus fruits is injured, especially that of fruit grown under moist and humid conditions, when the skin is full of moisture and so tender that the least sign of rough handling causes serious injury, as the cells of the skin are so brittle that they are easily broken, and when so broken a ready means of entry for the mould fungus is provided, and specking follows in due course.

The remedy for specking is in the hands of the grower, who must learn so to gather, handle, and transport the fruit from the orchard to the packing-shed, that it does not receive the slightest injury, and further, that when it has reached the packing-shed it must be carefully placed in shallow bins or on trays and be exposed to the air for at least seven days, so that the surplus moisture in the skin may be removed, and the skin thus becomes toughened and less easily injured. This drying of the skin is known as "sweating," and during the time the fruit is being sweated it should be kept under observation, and all fruit showing signs of specking or injury from fruitflies, sucking or boring insects, mechanical injury or bruising, should be removed.

In order to prevent injuring the skin when gathering, all fruit must be cut and not pulled. Gloves should be used to handle the fruit, and when cut it should be placed in padded baskets or other suitable receptacles. Any fruit that falls or is injured in any way should be rejected, as it is not fit to send to a distant market. At the same time, if the injury is only slight, it can be sent to a local market for quick sale.

For Southern markets only perfect fruit should be selected, and further, it must be graded for size, colour, and quality, and properly packed, only one grade of fruit being packed in a case. The cost of cases, freight, and marketing is now so high that only the best fruit will pay to send to the Southern States, and even the best fruit must be properly graded and packed in order to produce the best returns.

All orchards, vineyards, and plantations not thoroughly clean should receive immediate attention, as from now till the next rainy season the ground must be kept in a thorough state of tilth and free from weeds in order, in the first place, to retain moisture in the soil, and, in the second, to enable birds, ants, and predaceous insects to get at and destroy the pupæ of fruitflies and other pests harbouring in the soil.

Banana and pineapple plantations must be put into good order, and kept free from weed growth.

Land to be planted with trees should be got ready, as, if possible, it is always advisable to allow newly cleared land time to sweeten before planting.

Strawberries can still be planted, and the earlier plantings must be kept well worked and free from all weeds in order to get a good crop of early fruit.

Scrub land intended for bananas can be felled now, as there will be little more growth, and it will have ample time to dry off properly in time for an early spring burn. Do not rush scrub falling, as it is work that pays for extra care. Lopping will improve prospects of successful fire.

Keep a keen lookout for fruitflies, and on no account allow any fallen fruit of any kind to lie about on the ground unless you are looking for trouble with the ripening citrus crop. Keep the fly in check, and there will not be any very serious losses; neglect it, and there will not be much fruit to market.

The advice given with respect to the handling and marketing of citrus fruit applies equally to custard apples, pineapples, bananas, and other fruits. In the case of bananas handled by the Southern Queensland Fruitgrowers' Association, Limited, grading is now compulsory, and it will undoubtedly tend to stabilise the market for this fruit.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Practically the whole of the fruit crop will have been gathered by the end of March, but several of the later-ripening varieties of apples grown in the Granite Belt may be kept for a considerable time, provided they are free from fly or other pests and are stored under proper conditions. Varieties such as Jonathan can be kept for some months at a temperature of 31 to 32 deg., and later varieties, such as Granny Smith and Sturmer can be kept till apples come again if stored at the same temperature. At the same time, although storing the fruit at this temperature under artificial conditions enables them to be kept for many months, the fruit can be kept for a considerable period, and marketed from time to time as desired, by storing it in a specially constructed apple-house in or adjacent to the orchard where grown.

Such a store can be cheaply constructed in the side of a hill out of the soil of the district and slabs of timber. The soil will make excellent pisé for walls, and the roof may be constructed of slabs covered with soil. Such a store can be kept at a very even temperature, and if the air is changed during cool nights—not frosty nights—the temperature can be reduced to a low point—low enough to keep the fruit in good condition for many weeks.

All orchards and vineyards not already cleaned up must be put in order, and all weeds destroyed. Keep the surface of the soil stirred so as to give birds and insects a chance to get at any fruitfly pupæ, as it is necessary to destroy this pest whenever there is a chance of doing so.

Land intended for planting during the coming season should be got ready in order to expose the soil to the cold of winter, thus rendering it sweeter and more friable.

If there is any slack time in the course of the month, go over all surface and cut-off drains and put them in good order. Also, if during periods of heavy rain, soft or boggy spots have made their appearance in the orchard, do what draining is necessary, as badly drained land is not profitable orchard land, and the sooner it is drained the better for the trees growing upon it. Soft or boggy spots are frequently caused by seepage of water from a higher level. In this case a cut-off drain will be all that is necessary, but where the bad drainage is due to hard pan or an impervious subsoil, then underground drains must be put in. After draining, the land should be limed. Liming can be done now and during the following three months, as autumn and winter are the best times to apply this material.

When the orchard soil is deficient in organic matter (humus) and nitrogen, try the effect of green-crop manuring, planting the grey or partridge pea and manuring the ground for this crop with a good dressing of finely ground island phosphate or basic phosphate.

Where citrus fruits are grown, they should now be ready for marketing. If the land needs it, it should be given an irrigation, but unless the trees are suffering from want of water it is better to stick to the use of the cultivator, as too much water injures the keeping and carrying qualities of the fruit.

The remarks on the handling and packing of citrus fruits in the coast districts apply to the inland districts also, but these districts have an advantage over the coast in that, owing to the drier atmosphere, the skin of the fruit is tougher and thinner and in consequence the fruit carries better.

Farm and Garden Notes for April.

FIELD.—Those areas already lying in fallow for subsequent sowing with wheat should be kept in good tilth, using field implements that have a stirring effect in preference to those which tend to reverse the surface soil. The surface should never be allowed to cake; consequently all showers must be followed by cultivation, as soon as conditions will permit of teams and implements working freely.

Early fodder crops, such as barley (skinless or Cape) and certain varieties of wheat may be sown during April:—Growers of winter fodders will be well advised to study the article dealing with dairy fodder plots which appeared in February, 1922. Journal.

In those areas where seasonable rainfall permitted the planting of potatoes, these should now be showing good growth and must be kept free from all weed growths by means of the scuffle. If sufficiently advanced, and any doubt exists as to the prevalence of blight, advantage should be taken of fine weather to give a second spraying of "burgundy mixture," a calm and somewhat cloudy day being chosen if possible for the spraying.

Where land has been previously well prepared, lucerne sowing should be carried out this month, and intending growers of this fodder will be well advised to ascertain the germinating qualities of seed submitted to them for purchase. The difference between a good and bad "strike" is often traceable to the poor class of seed sown.

Maize and cotton crops should now be in the harvesting stage, and, once matured, are better in the barn than the open paddock, where weevils and other insects are usually prevalent at this season of the year.

Root crops sown last month should now be making fair growth, and during the early period of such should be kept free from weeds, and, where necessary, thinned out. Sowings of mangels, svedes, field carrots, sugar-beet, and rape may still be made where conditions of moisture will permit.

As the sowing season is close at hand for certain varieties of wheat, *i.e.*, those which require a fairly long period to develop in, every effort should be made to bring the seedbed into the best possible tilth and to free it from foreign growths of all kinds. The grading of all seed-wheat is strongly recommended, and growers who favour certain varieties should adopt a system of seed selection from prolific strains with a view to the raising of larger quantities of pure typical grain for ultimately sowing in their larger fields.

Pickling of wheat to prevent smut (bunt) is necessary. Germination tests should be carried out prior to commencing seeding operations.

Sorghums which have matured and are not immediately required as green fodder should, wherever possible, be conserved as ensilage to provide for a reserve, to tide over the period when grasses and herbage are dry. Succulent fodder of this description is the best possible form of insurance against drought, and for maintaining dairy and other stock in thrifty condition.

KITCHEN GARDEN.—Hoe continually among the crops to keep them clean, and have beds well dug and manured, as recommended last month, for transplanting the various vegetables now coming on. Thin out all crops which are overcrowded. Divide and plant out pot-herbs, giving a little water if required till established. Sow broad beans, peas, onions, radish, mustard and cress, and all vegetable seeds generally, except cucumbers, marrows, and pumpkins. In connection with these crops, growers are recommended to adopt some form of seed selection for the purpose of improving the quality of vegetables grown by them. Just at present, selections should be made from all members of the cucurbitaceæ (pumpkins, cucumbers, &c.). Tomatoes should also be selected for seed. Early celery should be earthed up in dry weather, taking care that no soil gets between the leaves. Transplant cauliflowers and cabbages, and keep on hand a supply of tobacco waste, preferably in the form of powder. A ring of this round the plants will effectually keep off slugs.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET. AT WARWICK.

1923.	JANUARY.		FEBRUARY.		MARCH.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5.1	6.49	5.25	6.46	5.45	6.24
2	5.2	6.50	5.26	6.46	5.46	6.23
3	5.3	6.50	5.27	6.45	5.47	6.22
4	5.3	6.50	5.28	6.44	5.47	6.21
5	5.4	6.50	5.29	6.43	5.48	6.20
6	5.5	6.51	5.30	6.43	5.48	6.19
7	5.5	6.51	5.30	6.42	5.49	6.17
8	5.6	6.51	5.31	6.41	5.49	6.16
9	5.6	6.51	5.32	6.40	5.50	6.15
10	5.7	6.51	5.33	6.39	5.50	6.14
11	5.8	6.51	5.33	6.39	5.51	6.13
12	5.9	6.51	5.34	6.38	5.51	6.12
13	5.10	6.51	5.35	6.38	5.52	6.11
14	5.11	6.51	5.36	6.37	5.53	6.10
15	5.12	6.51	5.36	6.36	5.54	6.9
16	5.12	6.51	5.37	6.35	5.54	6.7
17	5.13	6.51	5.38	6.35	5.55	6.6
18	5.14	6.50	5.38	6.34	5.56	6.5
19	5.15	6.50	5.39	6.33	5.56	6.4
20	5.16	6.50	5.40	6.32	5.57	6.3
21	5.16	6.50	5.40	6.32	5.57	6.2
22	5.17	6.50	5.41	6.31	5.58	6.0
23	5.18	6.49	5.41	6.30	5.58	5.59
24	5.19	6.49	5.42	6.29	5.59	5.58
25	5.20	6.49	5.42	6.28	5.59	5.57
26	5.20	6.48	5.43	6.27	6.0	5.56
27	5.21	6.48	5.44	6.26	6.0	5.55
28	5.22	6.47	5.45	6.25	6.1	5.53
29	5.23	6.47	...	...	6.1	5.52
30	5.24	6.46	...	...	6.2	5.51
31	5.25	6.46	...	...	6.2	5.50

PHASES OF THE MOON, ECLIPSES, OCCULTATIONS, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer" Time is not used.

3 Jan. ○ Full Moon 12 33 p.m.
10 " ☾ Last Quarter 10 55 a.m.
17 " ☽ New Moon 12 41 p.m.
25 " ☾ First Quarter 1 59 p.m.

Perigee on 8th at 9.54 p.m.

Apogee on 23rd at 11.24 p.m.

On 3rd January at 9 a.m. the Earth will be in perihelion, its least distance from the Sun about 91,300,000 miles. Three days later Venus will be in perihelion, and will be about 17,000,000 miles further from the Earth than it was on 25th November when in perigee.

On 29th January Mercury will be passing to the west of the Sun about 4 degrees on its northern side.

2 Feb. ○ Full Moon 1 53 a.m.
8 " ☾ Last Quarter 7 16 p.m.
16 " ☽ New Moon 5 7 a.m.
24 " ☾ First Quarter 10 6 a.m.

Perigee on 4th at 5.18 p.m.

Apogee on 20th at 6.18 p.m.

On 4th February Venus, apparently on the western border of Sagittarius, will be at its greatest western elongation, about 47 degrees from the Sun. On the 6th, soon after sunset, Saturn will be occulted by the Moon when below the horizon, but about four hours later the Moon, Saturn, and Spica will be apparently near to one another low down in the east.

3 Mar. ○ Full Moon 1 24 p.m.
10 " ☾ Last Quarter 4 31 a.m.
17 " ☽ New Moon 10 51 p.m.
26 " ☾ First Quarter 2 42 a.m.

Perigee on 4th at 8.48 p.m.

Apogee on 20th at 6.24 a.m.

The Moon will be partly eclipsed on the afternoon of 3rd March, and there will be an annular eclipse of the Sun on the 17th, but neither will be visible in Australia.

Saturn will be occulted by the Moon about 2 a.m. on 6th March, when apparently near to the bright star Spica in the constellation Virgo. This fine combination of celestial objects will be then high up in the sky, nearly overhead.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.


It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

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QUEENSLAND AGRICULTURAL JOURNAL

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PART 4.

Event and Comment.

The Current Issue.

In this issue many matters of importance affecting rural industries are fully dealt with. Special consideration has been given to the organisation of the agricultural industry in Queensland, and attention is called to the second article of the series covering an account of Californian co-operative methods and their applicability to Queensland. In this contribution Mr. J. D. Story's American investigations are readably set out. The entrance of the Queensland Producers' Association on its second year fittingly calls for a review of its functions and actual achievements, though, admittedly, the first year was devoted largely to organising preliminaries and spade work. In the report of the delegation from the recent Sugar Conference to Melbourne current sugar questions are well covered, and canegrowers will find much other matter to interest them in Mr. Edmund Jarvis's Science Notes and the regular field reports. Cotton, Queensland's coming industry, is well served with seasonable comment and instruction. General agriculture is served by timely notes on silage by the Director of Agriculture, Mr. H. C. Quodling. Topical illustrations are, as usual, a notable and popular feature. Much other interesting matter makes the April Journal a very readable number.

Farm Bureaux.

In the course of the first series of notes on Mr. Story's observations of Californian co-operative practice, published in the March Journal, the American farm bureaux system was fully described. It is a system well worthy of the closest study by those concerned in extending the operations of the Queensland Producers' Association. What has been accomplished in other countries in the way of agricultural organisation can surely be done in Queensland, and the experience of farmers in other parts of the world is valuable as an aid in evolving a solution of our own rural problems.

The Local Producers' Association.

The local producers' association as well as the district council possesses the possibility of becoming largely an educational agency in the broadest sense of the term. One of its best contributions to the welfare of the agricultural industry will surely be the dissemination, in an organised way, of methods of better farming practice as its members see it. When a need arises it will, as an organised unit, be in a good position to handle local and general economic problems in a practical and business-like way. The local association will, of course, comprehend clearly that in order to be an agent of progress it must also be a vehicle of work. It must be a creative, driving force. It must have a definite programme and definite projects. It must lay the tapes for attack on problems confronting the industry, and it will proceed precisely as fast as the members are willing to devote time and attention in tackling those problems. When an objective is reached, digging in and consolidation are essential. No association is worth its salt unless it does something. The mere passing of resolutions is seldom effective as a means of progress. Many organisations have been bogged in the morass of negation. Their members gradually worked themselves up into a state of mind whereby they somehow felt that by carrying resolutions they caused the world to advance. Days were spent in appointing committees and wrangling over the wording of flowing sentences, and the return home was doubtlessly lightened by a glowing sense of something attempted, something done, but without the knowledge that the sun had set upon a world no different from that upon which it had risen. As in all other enterprises utility must replace futility.

A Basis Upon Which to Build.

To be effective a Local Producers' Association must secure the active co-operative interest and work of all its members. No committee or board of directors alone can carry a local association forward to success. The greater the number of individuals involved in solving a problem the more certain it is that it will be solved correctly and the quicker will that solution be reached. The work of an association should be built up not only on a district programme, but on a community, or even an individual, programme. Members should lay down, at the beginning of each term, not only the part the district council is going to take in a programme of agricultural progress, not only the work which each centre is going to do and the projects it is going to further, but how farmers individually are going to act in aiding in the plan—what action they personally are to take in the enterprise. Built upon such a basis, the Local Producers' Association must become one of the most potent factors in rural life.

The Prickly-pear Commission.

The Royal Commission appointed by the State Government to inquire into the spread of the prickly-pear pest in Queensland and methods of controlling it has been busy, in the course of the month, taking evidence in Brisbane from scientists, departmental experts, and others. Further evidence is being taken in centres along the Western line, and it is the purpose of the Commission to visit pear-infested country and interview the holders. Subsequently, visits will be paid to other parts of the State where evidence will be taken and investigations made. Later, the Commission may take additional evidence if it is available in the capital.

The Cotton Guarantee.

"The cotton guarantee for the 1924 season has been fixed at 5d. per lb. for cotton of good quality, even though the staple is less in length than 1½ inches." The Premier (Hon. E. G. Theodore) made this announcement recently and added:—"The Government Cotton Expert (Mr. C. Evans), after his tour through the cotton-growing areas, and his consideration of the whole question, has advised the Government that the guarantee for the 1924 crop should be reconsidered with a view to giving better terms to the growers. He pointed out that the existing conditions involved the payment of 5½d. per lb. for seed cotton of not less than 1½-inch staple and 4½d. per lb. for cotton of shorter staple, but of good quality. He says that the only type of cotton that will produce a 1½-inch staple is Durango, and there will not be sufficient

of this seed to distribute amongst the growers. It will be clear, therefore, that under the existing terms of the guarantee the growers could only look for 4½d. per lb. for the 1924 crop. He has recommended, and the Government has agreed, that the guarantee should be 5d. per lb. for all cotton, even though it is less than 1½-inch staple, for the season 1924. In the meantime the Department of Agriculture will continue to control the production of Durango seed cotton, with a view to having sufficient of this seed available for the 1925 season. The Government has communicated with the Commonwealth Government asking its concurrence with the terms of the new guarantee. I anticipate that they will agree, and therefore give further encouragement to the cotton growers to make early preparation for the 1924 season."

Cotton Grading.

In the course of a recent Press interview the Minister for Agriculture and Stock (Hon. W. N. Gillies) said that the work of classification and grading of cotton is being taken in hand. Government cotton advisers have been paying special attention to this question, for it is essential that the article for sale shall be presented to the oversea buyers in the most attractive way. If this were not done, the worst bale of cotton shipped would most likely determine the price of the lot. This action will not in any way interfere with or alter the conditions of the Government guarantee. Mr Gillies stated further that, as a result of advice received from the experts, steps were to be taken at once to select areas of land, with soil typical of the districts where cotton was growing, where Durango and other seed would be raised on a large scale. In the course of a year or two, by this scheme, the whole of the requirements of the growers could be supplied with best known varieties of seed.

The Value of Pasteurisation.

The report of the South Burnett Co-operative Dairy Company contains an interesting reference to the value of pasteurisation, and states that since the company installed its pasteurising plant very satisfactory results have been achieved. The following comparison is made from the figures supplied:—

Butter manufactured in January, 1922. (Not pasteurised.)				Butter manufactured in January, 1923. (Pasteurised.)			
Choicest	..	..	.. Nil	Choicest	..	..	.. 34 p.c.
First	..	..	.. 40 p.c.	First	..	..	.. 61 p.c.
Second	..	..	.. 32 p.c.	Second	..	..	.. 5 p.c.
Third	..	..	.. 18 p.c.				
Pastry	..	..	.. 10 p.c.				

These results were achieved under similar weather conditions.

Cotton Pests.

Discussing cotton pests with a Press interviewer recently, Mr. C. Evans (Cotton Adviser to the Queensland Government) said that the pink boll worm, which is unknown in Queensland, must not be confused with the boll weevil, which is an entirely different insect and the cause of such enormous damage in the United States of America. The boll weevil, so far as is known, is absolutely confined to the cotton States of U.S.A. and Mexico. The pink boll worm, on the other hand, is a native of India, where it has been known and studied for many years. The pink boll worm was introduced into Egypt about 1910 in some bales of cotton imported from India for the Alexandria spinning mills. These bales contained some seed which had passed through the gin, and this seed carried the larvæ of the pest in the resting stage. The pest spread rapidly through the Nile Delta and seemingly became very destructive under Egyptian conditions. The Egyptian experience and experience of the pest in other countries emphasised the care that must be taken in the importation of cotton seed from abroad, and the necessity for strong and strictly observed quarantine regulations. Any person who imports seed through the post privately may unwittingly introduce a pest of this sort into Queensland, and so be the means of causing the greatest damage to our young and promising cotton-growing industry.

ORGANISATION OF THE AGRICULTURAL INDUSTRY IN QUEENSLAND—II.

By J. D. STORY, Chairman Administrative Committee, Council of Agriculture; and J. F. F. REID, Editor of Publications, Department of Agriculture and Stock.

In the first article of this series, published in the March Journal, the American Farm Bureau Organisation was described and compared with the plan of the Queensland Producers' Association. In this instalment various phases of American marketing methods, relating more particularly to fruit, but capable more or less of diversified application, are discussed.—Ed.

GRADING, PACKING, AND MARKETING.

In a previous article the organisation of agriculture has been dealt with, and the Queensland Producers' Association has been compared with the American Farm Bureau Organisation. The farmers of America realise that the marketing problem is one of the greatest and most important questions they have to meet for many years. The farmer had been accepting whatever price he had been offered, and paid what he had been asked, but he realised that there was somehow, somewhere, too broad a margin between what he got and what the consumer paid. Hence the farmers got together to try to overcome their marketing difficulties.

In most of the States, Government market departments have been established to assist the producers, and, though the operation of these departments vary slightly in the different States, their general functions are similar—namely, to investigate market conditions; to furnish advice and assistance to producers, distributors, and consumers; to promote effectual and economical methods of marketing; to establish, administer, and enforce standards of weights, grades, and measures; to assist in the organisation and development of co-operative associations; and to collect and distribute market information. Many of the State departments issue daily market reports, and publish weekly, fortnightly, or monthly bulletins dealing with general marketing questions.

The Question of Distribution.

No matter how scientific food production may become in the actual labour processes, it cannot attract or hold the efforts of its followers unless adequate provision can be made for distribution of products. Though in the past the organisation of agriculture has not got very far beyond the gateway of the farm, the same is not true of other industries. The factory, for example, would not abandon its goods as soon as they were manufactured, but the premier ability of such a concern would be included in its selling organisation, and that organisation would be supplied with the capital necessary for efficient working.

In many instances the farmer has waited for some outside agency to solve his problems for him, and this waiting has not improved his own condition or that of the consumer. It must be remembered that such outside organisations do not undertake projects for the love of the work; these organisations are not so much concerned in the expenses incurred by the farmer in producing and sending his goods to market as they are concerned in selling the goods at a price which will return a commission.

American Experience.

The consensus of opinion in California now is that the State Market Division can be used to no better advantage than in assisting in the organisation and maintenance of associations for the co-operative marketing of the food supply of the State.

A survey was made in 1919 comparing wholesale prices of organised products with prices of unorganised products, and it was found that the prices of unorganised products had increased over the 1914 prices 26 per cent. more than the prices of organised products.

Co-operative selling by farmers is not a radical departure from, but is rather the adoption of, accepted business practice in the manufacturing world. The average farmer, engaged as he is in actual production, cannot be expected individually to

organise efficient marketing machinery, but he can organise very satisfactorily in conjunction with his fellows, and employ, to attend to the problems of distribution, the same high grade type of man as is employed by the manufacturer.

So far as can be gathered, the solution of marketing problems, as applied to agricultural products generally, has not yet been solved, and no one organisation or group of associations has been established to take charge of the whole of the marketing. In various States, however, various organisations have achieved success in the marketing of certain products for their members—in some instances such organisations handle only a particular product, and in others different products of a similar kind.

In the State of California, for example, over thirty associations last year attended to the marketing of approximately 50 per cent. of the total agricultural and horticultural output, such percentage being of the aggregate value of 250,000,000 dollars. For the purpose of co-ordination and continued assistance the Director of Markets arranges with each association, which he assists in organising, that he shall have the right to nominate one of the directors; he does so in order that he may keep in touch with the activities and the policy of the association; usually he nominates a man of proved business ability.

Factors Affecting the Problems of Marketing and Distribution.

In dealing generally with the marketing problems, and taking it for granted that good-quality products can be produced, there are a number of factors which must be taken into consideration—harvesting, grading, packing, knowledge of market requirements or demand, transport arrangements, selling agencies, and advertising. Though these factors are necessarily inter-related, let us divide them for purposes of study into two sections—first, those dealing with the preparation of products for market; and, second, those relating to the organisation of the selling of the products so prepared. As a concrete example of successful co-operative marketing as applied to a particular class of product let us consider the methods of the California Fruit Growers' Exchange in the marketing of citrus fruit.

Californian Experience prior to Co-operation.

Though the citrus industry at California is now fairly established, it had a very small beginning and experienced many difficulties. In the early history of the industry lack of co-operation and systematic marketing methods made the future of citrus crops uncertain. The fruit was carelessly handled, irregularly graded, packed in slipshod manner, and shipped to this or that market indiscriminately. Under such conditions the fruit kept poorly, markets were alternately glutted and under-supplied, and with increasing production the marketing abilities of the small distributors were taxed to the utmost and the business was hazardous to fruit merchants and growers alike.

In 1892-3 growers, in many instances, not only furnished their entire crop for nothing, but were also required to pay the freight and packing charges which the gross sale of their fruit did not cover. It was frequently the case that the larger the crop the more the grower was indebted to his packer at the end of the season. A continuance of these conditions would assuredly have forced many growers to dig up their trees.

Genesis of the Californian Fruitgrowers' Exchange.

Following upon this year of disaster the growers held a convention, and decided to work out the marketing problems amongst themselves.

As a result of that convention, the organisation of associations and district exchanges was effected in all the principal citrus fruit districts, and it was arranged that the packing should be done by the associations at cost, and that the marketing should be managed through an executive committee composed of one member from each district. The results during the first two seasons were not entirely satisfactory, and the central exchange was organised—that organisation has since developed into the present Californian Fruit Growers' Exchange.

The exchange system was simple and democratic. The local association consisted of a number of growers contiguously situated, who united for the purpose of preparing their fruit for market on a co-operative basis. They established their own brands and made their own rules as to the grading, packing, and pooling of their fruit. Usually these associations owned thoroughly-equipped packing houses; every grower's fruit was separated into different grades according to quality and placed in the common pool. Later, each grower received his percentage of the returns according to grade.

The theory upon which the exchange worked was, that every grower is entitled to furnish his *pro rata* of the fruit shipped through his associations and every association to its *pro rata* of the various markets of the country. This theory, reduced to practice, gives every grower his fair share, and the average price of all markets.

PRESENT METHODS OF PREPARING ORANGES FOR MARKET.

It is recognised that good-quality fruit and regular supplies are necessary in the stabilisation of a marketing scheme. Due attention therefore is given, in many cases under the direction of the associations, to the cultivating, fertilising, irrigating, pruning, and fumigating of orchards; and varieties of trees have been selected with a view to securing a year-round supply.

The two principal varieties of oranges now grown are the "Navel," which matures in the winter months, from December to May, and the "Valencia," which matures in the warmer weather, from May to December. Ninety per cent. of the oranges grown in California are of these varieties.

Field Operations.

The picking is done in many cases by picking crews directed by the local packing associations. Oranges and lemons are not picked or pulled from the trees, but are carefully clipped from the branches with specially designed clippers. The stem is clipped close to the fruit, so that no stem end is left to puncture or scratch other fruit when packed. The orange is carefully removed from the tree to avoid its being scratched on the limbs of the tree, and is carefully placed in a picking sack to prevent its being bruised. Bruises and skin punctures allow decay spores to enter, and thereafter spoilage quickly follows. Ordinarily, oranges and lemons will not decay quickly unless the skin has been injured, and consequently the fruit is handled from the time it is cut from the tree almost as carefully as eggs are handled.

When the picker's sack is filled, the fruit is placed in field boxes by lowering the sack into the box, unfastening a flap at the bottom of the sack, and then carefully lifting the sack from around the fruit. Each picker also places a tag or a mark of some kind in each box filled by him, and faulty handling can easily be traced. The fruit is then carted to the packing shed in trucks covered with tarpaulin to protect the fruit from the sun, and several boxes from each load delivered are inspected to ascertain the care which is being shown in the picking of the fruit.

Packing and Grading.

The work of the packing-house begins with the cleansing of the fruit; this is generally done by passing it through huge washing machines equipped with swiftly revolving soft brushes and using clean warm water. Next, the fruit is conveyed by mechanical means from the bath through the dryer, where it is exposed to a heavy blast of air, which thoroughly dries it before it is landed on the grading table.

At the grading table every orange is examined by experts, and carefully placed in the grade to which it belongs. The graders stand before a long belt, on which the fruit is carried, and pick out the various grades and place them on conveyors to be automatically sized according to diameter, and carried to the proper bins for wrapping and packing.

Packers, wearing soft white gloves to prevent injuring the skin of the fruit, carefully wrap the fruit and place it in boxes for market. In order that carelessness may be corrected, each packer places a ticket in each box packed. Oranges are packed in different sizes, each size being placed in the box in a certain geometrical arrangement, and each box containing a specified number of oranges (varying according to size). A box of "Sunkist 126," for example, would contain 126 oranges of best quality and appearance and of uniform size.

The standard grades are fixed by representatives of the growers, packing associations, and distributors, and it is claimed that the regular supply of uniformly graded fruit has given general satisfaction to the consumer, the selling agent, and the grower. The C.F.G.E., which supervises most of the marketing operations of oranges, lemons, and grape fruit in California, pays special attention to the marketing of the "Sunkist" brand, and employs its own inspectors to ensure that fruit packed under that label is up to standard. The attached particulars in regard to grade specifications, kindly supplied by the Exchange, may be of interest to the citrus growers of Queensland.

MARKETING ORGANISATION.

THE LOCAL ASSOCIATION.

In California the individual packing shed is a thing of the past. The association sheds are controlled by a directorate elected by the growers, and a manager experienced in the handling and selling of fruit is appointed. The growers who are members of the association are required to sign contracts, and are not permitted to interfere with the management of the sheds. These contracts provide that the grower shall pick, haul, and deliver to the packing shed of the association, and at such times and in such quantities as the association or its agent may direct, all the citrus fruit grown upon his land during the term of the agreement. The association agrees to receive, pack, sell, and market all the fruit whenever a market can be found, and to pay to each of the growers the amount received for his fruit less the charges for packing, transport, and selling.

THE DISTRICT EXCHANGE.

Next to the Local Association (or Exchange) comes the District Exchange, which is also run on a no-profit basis. These District Exchanges act as clearing houses in marketing the fruit for the Local Associations, and act as the media through which most of the business between the Local Associations and the Central Exchange (referred to later) is performed. The District Exchange orders cars and sees that they are sent to the various association loading places; keeps a record of the cars shipped by each association and of their destination; receives information from the Central Exchange on all phases of marketing, and places that information before the Local Associations; receives the proceeds for the sale of the fruit, and apportions such proceeds to the associations concerned. Each of the Local Associations enters into a contract with the District Exchange to the effect that it will market through the District Exchange the whole of the fruit produced by its members, and that the District Exchange may retain brokerage to cover the expenses incurred. The agreement further provides that the District Exchange shall do its best, as the agent of the associations, to sell and dispose of the fruit; but it accepts no responsibility or financial liability other than receiving the proceeds and apportioning them equitably after deducting brokerage for expenses. Associations which fail to deliver fruit controlled by them loaded on cars at the loading stations are charged 25 cents per box as damages.

THE CENTRAL EXCHANGE.

Powers and Functions.

After the District Exchange comes the Central Exchange, which is really a central executive, whose duty it is to furnish marketing facilities to the District Exchanges at a *pro rata* share of the cost. Each District Exchange enters into an agreement with the Central Exchange to the effect that it will ship all fruit of which it has control through the agencies established by the Central Exchange, and will consign all shipments through and by the Local Exchanges to some point at which the Central Exchange has representation. The agreement further provides that, if a District Exchange fails to ship all its citrus fruits as provided, or disposes of all or any of it elsewhere or otherwise than is provided, such District Exchange shall pay as liquidated damages to the Central Exchange a sum of 25 cents per box on all fruits disposed of in a manner contrary to the agreement.

The Central Exchange places bonded agents in the principal markets; it gathers full information of the conditions in each market; receives telegraphic advices of the sale of each car of fruit, and furnishes the information every day to the associations; it takes care of litigation that may arise in connection with marketing, and handles all claims; it conducts an extensive advertising campaign to popularise fruit and develop new markets.

With the information then at its disposal, each shipping agency may regulate its shipments, develop its own brands, use its own judgment as to when and in what quantities and to what markets the fruit shall be shipped, and the price it is willing to accept. There is no uniformity in price for different brands—every brand sells on its own merits. The agent in the market acts directly under the orders of the shipper; the Central Exchange does not interfere, but is the medium through which orders for fruit pass from the agent to the shipper. It furnishes such associations daily with information regarding general movements of cars, general conditions of markets at different places, the prices at which all Exchange fruit is sold, and such other information as will enable growers and shippers, through their associations and District Exchanges, to decide the questions of distribution for themselves.

The Exchange never contemplated the opening of wholesale or retail houses, but to put the fruit into the hands of legitimate dealers first hand. It established a system of agencies in all the principal cities of the country, employing capable and experienced agents. Most of these agents are salaried officers, and have no other business to engage their attention. They sell the fruit to smaller cities within their districts.

Over all these agencies are travelling agents, who have authority to supervise and check the work of the various agencies. These general agents maintain a bureau of information through which all agents receive every day detailed information as to sales of Exchange fruit in other markets on the previous day. This information enables the agents to fix prices, and if an agent is unable to sell at the average prices prevailing elsewhere, he promptly advises the head office, and sufficient fruit is diverted to other markets to restore normal prices. Approximately 40 per cent. of the fruit is sold by public auction, and the remainder privately at prevailing market rates. Through the agents the Exchange receives and transmits to its members trustworthy information regarding market conditions, visible supplies, &c.

Results of Combination.

The trade found it much more satisfactory to deal with a central body with representatives on the ground than to negotiate with individual shippers hundreds of miles away. The wholesale and retail merchant found that the fruit was more uniformly graded, more attractively packed, kept better, and was easier to sell; and that supplies came forward more regularly. To-day the Exchange has 10,500 growers, 200 packing associations, 20 District Exchanges, and 77 sales offices. From these sales offices the fruit is distributed to 2,500 wholesalers and 400,000 retailers.

To sum up the advantages of co-operative marketing, it is claimed that the packing and selling costs have been reduced by one-third, transportation charges have been reduced by 10 per cent., Customs duties on imported fruits have been put on a fair basis, the present-day large crop is successfully marketed, whereas thirty years ago a comparatively smaller crop was regarded as an over-supply, and consumers get better fruit at a lower price than ever before.

ACTIVITIES INCIDENTAL.

In addition to the sales staff, the Exchange has several other departments or branches which concentrate on special matters relating to its business. Some of the more important of these departments are—

The Advertising Department.

The public is particularly attentive now to sound information regarding diet and nutrition generally. Wide publication of facts regarding malnutrition or under-nourishment of city children, due to deficiencies in diet, has focussed public attention on the relation of proper diet to health. Government agencies, teachers, and the medical profession are united in urging a greater use of fruit and vegetables. Last year coloured pages in leading national magazines, especially magazines appealing to the housewife, were the principal means of advertising the merits of citrus fruits. A feature which has also been developed is the sending to newspapers and magazines of interesting news material in connection with the industry. New recipes, facts on nutrition, current news of the industry, history of the Exchange, articles on selling, fruit displays, and stock turnover are typical subjects. Over 145,000 persons wrote requesting the Sunkist recipe-book and other booklets, which are distributed at cost.

Dealer Service.

Experienced men call on retail merchants, show them the importance of good displays, arrange special sales of fruit, distribute display material, and explain the wisdom of reasonable margins and quick turnover. Every practical sales idea and every successful display method gathered from several years' experience in working with the retail trade in all sections of the country are disseminated by these men, who are practically a clearing-house for practical ideas and methods. These men last year visited 12,000 retailers, and personally decorated 8,000 stores. Personal work is supplemented by a mail service, circulars and individual letters being used to interest the trade in the dealer service and to broadcast successful sales plans and ideas.

Fresh Fruit Drinks.

Last year the Exchange manufactured and sold to soda fountains 5,000 Sunkist fruit-juice extractors, thus introducing for the first time in a large way the service of fresh fruit drinks at the fountains. Hitherto the fountains generally have offered their

customers orange and lemon drink substitutes made synthetically or from preserved concentrates, and the development of this field for marketing fresh fruit has awaited the perfection of a practical device for extracting fruit juice. A wide distribution of the new machine, together with proper advertising, will now create a new outlet for large quantities of citrus fruits.

Traffic and Claims.

This branch has secured material reductions in rail freights on car-loads of fruit and on orchard-heaters railed from factories in the East. Claims for overcharge and loss and damage in transit amounting to 300,000 dollars were collected last year. The shortage of refrigerator cars is also receiving attention.

Law.

Keeps informed on and reports to the Directors important developments and trends in legislative matters pertaining to the co-operative movement and to agriculture in general. In addition to public policy questions affecting the organisation, members are kept fully informed regarding laws governing taxation in the various States and their interpretation by the Courts, trade mark infringements, welfare of employees, and employers' liability. Consideration is constantly given to Local Association questions of organisation and finance as well as to individual problems arising in the conduct of their affairs.

Field Department.

There is a well-organised Field Department experienced in the enforcement of regulations governing advertised brands. The organisation has clearly recognised its responsibility to the trade and the public, as well as to the growers, of fully maintaining the quality of its advertised brand, consequently that brand has never stood higher, nor has the confidence placed in fruit of that brand by the trade and the consumers been more merited. In addition to inspection work, the Field Department actively assists shippers in all problems relating to the handling of fruit and in making known to growers the advantages of co-operative marketing as conducted by the Exchange.

Pest Control Bureau.

In co-operation with the local, State, and national agencies, the Pest Control Bureau assists growers in adopting the most practical and effective control measures, and stimulates the development of better control generally. The Bureau also concerns itself with the enforcement of strict quarantine and other preventive measures against the ever-present danger of pests being introduced into the citrus districts.

Exchange Research Laboratory.

Investigates problems of a chemical nature connected with the citrus industry, and assists the by-product companies formed by Exchange growers in developing a profitable outlet for the increasing quantities of fruit not suitable for sale as fresh fruit.

Lemon Products Company.

Last year the company produced 12,000 lb. of lemon oil and 600,000 lb. of citric acid, the whole of which was sold. The capital of the company is 250,000 dollars, and the tangible assets 280,000 dollars. Since its organisation in 1915 the company has purchased from shippers cull lemons to the value of 400,000 dollars.

Orange Products Company.

The company operated by members to develop methods for the utilisation of oranges not suitable for shipment. A successful process has been put into operation for the recovery of oil of orange; very encouraging results have been attained in the manufacture of concentrated orange juice; and attention is being given to the manufacture of other products. During the two years of its existence the company has processed fruit at the rate of 1,200 tons per month, and this year it will be able to return to growers a creditable amount for a large volume of fruit which on account of damage by frost would otherwise have been practically useless.

Packing-house and Orchard Supplies Company.

A Fruit Growers' Supply Company has been organised to secure packing-house and orchard supplies. The authorised capital of the supply company is 6,000,000 dollars, of which over 4,000,000 has been paid in, and the remainder is being gradually collected from the growers at the rate of 2 cents (1d.) per box on their shipments through the Exchange. The company has two lumber plants to cut timber on the land purchased from the Government, and it is in a position, if need arise, to furnish the full requirements of growers for boxes from its own mills. In its purchases of the principal materials for use in the industry, it is directly in touch with the sources of supply, and with its large volume of purchases is in a position to secure such supplies for the growers at the lowest possible prices.

APPLICATION TO QUEENSLAND.

Some of the outstanding features of the Californian Fruit Growers' Exchange which are quite capable of adaptation to Queensland conditions are—

- (1) The employment of salaried agents to concentrate on the marketing problems in various cities; to collect data as to supply and demand; to telegraph particulars as to prices obtained for Exchange fruit; and to do all in their power to extend the markets in their particular centres.
- (2) The organisation of local packing associations for the grading and packing of fruit for market, and of district associations to act as the forwarding agents.
- (3) The systematic attempt to provide for the orderly shipment of fruit to markets in sufficient quantities to meet the demand but not sufficient to cause over-supply.
- (4) The formation of companies or trading societies for the treatment of fruits not up to standard grade, and of expert departments or branches to deal with special problems such as legal matters, claims, research, &c.
- (5) The systematic advertising of standard products and other propaganda for encouraging the use of fruit in greater quantities.

SUGGESTIONS.

In its programme for 1923-24 the Council of Agriculture should be mainly concerned in the solution of problems connected with the harvesting, grading, packing, storage, transport, and marketing of produce; and in the arrangements for obtaining, at satisfactory prices, supplies required by producers. To enable the Queensland Producers' Association to carry out the functions as outlined it is suggested that—

- (1) Its objects as defined in the Primary Producers' Organisation Act should be extended to include power to trade or to make arrangements with trading concerns for the conduct of its business.
- (2) The Primary Products Pools Act should be amended to permit the Council, for co-ordination purposes, to have the right to nominate one member of each commodity board appointed under that Act.

Power to Trade.

The power to trade would not necessarily result in the establishment of a big trading concern controlled directly by the Council. It should be open to the Council to make arrangements with existing traders, firms, or companies for the conduct of its business, and it should be possible for the Council to co-ordinate the activities of existing farmers' co-operative companies or societies. The general scheme might be as follows:—

- (1) The Council to act as a central administration directly controlling general matters such as organising, collection and distribution of data, and general supervision of marketing.
- (2) Where existing farmers' trading societies can be amalgamated or improved upon under co-ordinated methods, the Council to try to effect such improvements and to secure representation on the directorates of such societies.
- (3) Where satisfactory arrangements cannot be made with existing farmers' trading societies or other traders the Council to organise sectional trading societies to facilitate the harvesting, packing and grading, storage, transport, and marketing of products; the Council to be represented on the directorates of these trading societies for the purpose of co-ordinating effort.

The societies to adopt rules approved by the Council, and to register under "*The Industrial Provident Societies Act of 1920*" if considered practicable.

(Note.—"*The Industrial Provident Societies Act of 1920*" permits of registration of any trading society whose capital is restricted to £100 per member; and upon registration the society may engage in any trade operations permitted by its rules. In the interest of members the Registrar examines these rules prior to registration to ensure that proper safeguards have been made.)

- (4) The District Councils and Local Producers' Associations and District Agents to act as media through which the Council obtains data as to production, organises the societies mentioned, and supplies information to growers.

Under such a scheme there may come into operation—

- (a) A number of societies for the purpose of co-operative handling of products and preparing them for markets. Such societies might include—
 - Local or district co-operative grading and packing and storage sheds.
 - Local or district societies for conservation of fodder.
 - Local or district herd testing societies.
 - Local or district societies for joint purchase of high-power machines, harvesters, cultivators, transport wagons, tractors, pure bred sires, &c.
- (b) An organised system of collecting and distributing market information to enable such societies to ship to the best markets and in such quantities as will facilitate the sale of the produce.

Marketing of Fruit.

It is suggested that the Council of Agriculture should forthwith try to organise the marketing of fruit, and that the following scheme in regard to procedure to be adopted should be extended to other commodities so far as that procedure can be applied:—

- (1) That in connection with the marketing of fruit the Council of Agriculture take steps forthwith to extend as far as possible the existing local markets and to discover new markets within the State.
- (2) That for the purposes of (1) each District Agent be required to act as a markets officer for his district and to keep the Council advised as far as possible of stocks in sight, ruling market prices, movement of products, markets over-supplied or under-supplied, &c.
- (3) That subagents be appointed, on terms to be arranged by the Council, to assist the District Agent in collecting the data. For example, in the Rockhampton district the District Agent would be responsible for the town of Rockhampton, but he might have a subagent at Mount Morgan, one at Gladstone, and one in such other centres as may be arranged, to collect for him (for transmission to the Council through him) the data at such subcentres.
- (4) That on receipt of such data the Council cause it to be tabulated and supplied forthwith to the recognised co-operative associations which are working in conjunction with the Council.
- (5) That on receipt of the particulars furnished by the Council these associations arrange for the necessary supplies to be forwarded through their agencies to the centres concerned.
- (6) That to ensure that good fruit shall be forwarded and that satisfactory markets may be established and maintained standard grades and packs be determined.
- (7) That the standards be determined by a duly appointed conference consisting of representatives of the Department of Agriculture, Council of Agriculture, the recognised societies, the producers, and the trade.
- (8) That if produce of a standard inferior to the prescribed standard be forwarded by a producer, such producer be warned that he will be debarred from participating further in this scheme of distribution.
- (9) That centres be encouraged to pool their produce and to try to establish a recognised brand for that centre, which will become known in the markets of the State by its uniformly good quality.
- (10) That for the purposes of this scheme District Councils, District Agents, and Local Producers' Associations in so far as they are concerned be urged to organise their districts.

- (11) That an organised scheme of advertising and sales methods be instituted to encourage the trade and the consumers to buy standard grades of fruit.
- (12) That in due course the Australian markets be organised by the Council of Agriculture in similar manner.
- (13) That, should it be found in due course that the Queensland and Australian markets are unable to absorb the whole of the produce, steps be taken by the Council to find outside markets.
- (14) That the best possible provision be made with the help of the Agricultural Department and the Queensland University for the treatment and utilisation of inferior grades of fruit.
- (15) That upon the finding of any commercial process or treatment for such fruits co-operative societies be formed for the handling of the work.
- (16) That the question of establishing co-operative societies or a central co-operative society for the purchase of orchard or packing requirements be fully considered.

[The proposals for the extension of powers of the Council and the suggestions for the marketing of fruit have already been referred to the Council of Agriculture and adopted.—Ed.]

GRADE SPECIFICATIONS.

ORANGES.

Following are the grade specifications of the California Fruit Growers' Exchange referred to in the foregoing article:—

Sunkist.

Mature oranges of one variety; of good eating quality; well-grown specimens of normal form, picked from the tree; of good colour for the variety; of good texture; excluding rough, coarse, more than slightly puffed, more than slightly scarred, more than slightly sunburned, or misshapen fruit, or dirty fruit, making it uninviting in appearance to the consumer; substantially free from scale, other insect or fungus diseases, splits, or defects of any kind that cause fruit to decay; excluding fruit showing effects of frost or which cuts dry for any other reason. Oranges packed under the Sunkist brand shall not vary more than 10 per centum below the foregoing specifications, except as provided in the special rule relating to frosted or dry fruit.

Red Ball Oranges.

Mature oranges of one variety; of good eating quality; well-grown specimens of fair form, picked from the tree; of fair colour for the variety; of fair texture; excluding badly sunburned, very rough, very coarse, badly puffed, badly scarred fruit or fruit so sealy as to make it uninviting in appearance to the consumer; substantially free from other insect or fungus diseases, splits or defects of any kind that cause fruit to decay; excluding fruit showing effects of frost or which cuts dry for any other reason. Oranges packed under this grade shall not vary more than 5 per centum below foregoing specifications.

LEMONS.

Sunkist.

Lemons, well-grown specimens of normal form; excluding fruit with abnormally long necks; of good uniform colour; excluding fruit more than slightly sunburned or more than slightly green in colour; of good texture; excluding rough, coarse fruit, and fruit with deep dark scars, or dirty fruit, making it uninviting to the consumer; substantially free from scale, other insect or fungus diseases or defects of any kind that cause fruit to decay; excluding spongy, hollow centre fruit and fruit affected with interior decline, blossom end decay, or fruit showing effects of frost or which cuts dry for any other reason. Lemons packed under the Sunkist brand shall not vary more than 10 per centum below foregoing specifications, except as provided in the special rule relating to frosted and dry fruit.

Certified Choice.

Lemons, well-grown specimens of fair form, of fairly uniform colour; excluding fruit badly sunburned or very green in colour; of fair texture; excluding very rough, very coarse, badly scarred, dirty fruit, fruit so sealy as to make it uninviting in appearance to the consumer substantially free from other insect or fungus diseases or defects of any kind that cause fruit to decay, excluding very spongy or badly hollow-centre fruit and fruit affected with interior decline, blossom end decay, or fruit showing effects of frost, or which for any other reason cuts dry. Lemons packed under this grade shall not vary more than 5 per centum below foregoing specifications.

Special Rule Relating to Frosted and Dry Fruit.

No oranges, lemons, or grapefruit shall be shipped under the Sunkist brand or the Certified Choice brands, if the shipment contains fruit, in excess of 5 per cent., showing effects of frost, or which cuts dry for any other reason.

Special Rule Relating to Wrapping.

All oranges, lemons, and grapefruit, with the exception of tangerines and mandarins, packed under the Sunkist brand must be wrapped in paper wraps on which is printed the Sunkist brand design or trade mark. Oranges, 252's and smaller, may be packed under the Sunkist brand without wrapping.

Special Rule Relating to Maturity of Navels and Valencias.

Navel and Valencia oranges shall be considered immature if the juice does not contain soluble solids equal to or in excess of eight parts to every part of acid contained in the juice, the acidity of the juice to be calculated as citric acid without water of crystallisation.

Special Rule Relating to Compliance with Federal and State Laws.

No fruit, oranges, lemons, or grapefruit, will be handled by the C.F.G.E. under any brand or grade, or at all, unless the same shall in all respects conform to the laws of the State of California, and, if the sale is made in interstate commerce, to Federal laws, and to the laws of the place where the fruit is sold. The Field Department shall inspect all grades of citrus fruit shipped through the C.F.G.E., and shall in every way endeavour to make uniform the enforcement of the laws concerning the shipment of California citrus fruit.

Enforcement of Grade Specifications.

The enforcement of the grade specifications is lodged with the Field Department of the C.F.G.E. The Field Department shall determine whether the fruit being packed for shipment complies with the grade specifications, and, furthermore, shall be charged with the authority to compel repacking of the fruit in case it is not up to grade specifications.

If any member of the Field Department finds fruit that, in his opinion, is below the specifications adopted, he shall immediately take the matter up with the shipper or the manager of the Association. If they cannot agree, then the manager of the District Exchange and the supervising inspector shall be called into consultation. In case these cannot agree, the manager of the Field Department shall be called in and his decision shall be final. It is understood, of course, that if any shipper feels that the manager of the Field Department has erred in his judgment, he may properly bring the matter before the management of the C.F.G.E.

Method of Listing Certified Choice Brands.

Each association wishing to abide by the specifications formulated for choice grade shall designate the brand or brands under which it will ship fruit that conforms to the specifications governing choice, and which will be subject to grade inspection by the Field Department. A list of certified choice brands will be forwarded to all district managers, who will be advised that these brands are being packed in accordance with the choice grade specifications, and are subject to grade inspection by the Field Department.

Penalties for Violating Sunkist Grade Specifications.

It is the policy of the C.F.G.E., as the owner of the trade mark "Sunkist," that in case of the persistent misgrading of fruit for shipment under this brand that the Exchange will not distribute any fruit of such association under such trade mark, and all shippers, division managers, district managers, and the advertising department shall be notified to such effect.

Penalties for Violating Choice Grade Specifications.

It shall be the policy of the C.F.G.E., in case of the persistent misgrading of fruit under the specifications governing choice, to withdraw the shipper's brand from the certified list, and all shippers, division and district managers shall be notified to such effect.

THE FUTURE OF THE SUGAR INDUSTRY.

QUEENSLAND DELEGATION IN MELBOURNE.

On Friday, 2nd March, representatives of the Queensland Sugar Industry, appointed as a delegation from the recent Sugar Conference in Brisbane, met the Prime Minister, Hon. S. M. Bruce, M.C., in Melbourne, and discussed with him urgent matters affecting the future of the Sugar Industry. The Minister for Agriculture and Stock, Hon. W. N. Gillies, led the delegation, and pressed for a renewal of the existing agreement under which the industry has become substantially stabilised. Points in favour of renewing the agreement or adopting the submitted tariff alternative were stressed strongly by members of the delegation, who represented every section of the sugar industry.

The Prime Minister, in the course of his reply, stated that the Federal Government realised fully the value of the industry both nationally and economically; he held out no hope for the renewal of the agreement, but promised that the industry would be safeguarded fiscally. The proceedings in Melbourne are reported fully hereunder.—Ed.

A delegation from the Sugar Conference held in Brisbane recently, and representing the various sugar interests of the Commonwealth, waited on the Prime Minister, Hon. S. M. Bruce, M.C., at Melbourne, on Friday, 2nd March. The delegation was introduced by Senator T. Givens (Q.).

ADDRESS BY MR. W. N. GILLIES.

Hon. W. N. Gillies, Minister for Agriculture in Queensland, was the first speaker. He said: The gentlemen now before you have been appointed as a delegation from a Conference called by the Queensland Government representative of the sugar industry of Queensland, and with them are two representatives of the industry in New South Wales.

My Government was keenly disappointed when the Federal Parliament dissolved without dealing with our request for a renewal of the Sugar Purchase Agreement. The small increase in the tariff we could not regard as a satisfactory alternative. The Conference referred to was called immediately after the Federal elections, and, as you are aware, no time has been lost in pressing for this interview, the object being to place our case in your hands before your Government formulates a sugar policy. As you had agreed to receive this deputation, we were disappointed keenly to hear your statement in Parliament yesterday against a renewal of the Sugar Purchase Agreement, because our mission is to urge upon your Government the consideration of the following resolution:—

“That in view of the fact that the effect of the current Sugar Agreement has been to substantially assist to stabilise the industry, and having regard also to the very great importance which the industry is economically, industrially, and nationally to the Commonwealth as a whole, and to the States of Queensland and New South Wales in particular, this Conference strongly urges upon the Commonwealth and State Governments the urgent necessity of renewing the Agreement, at the same price, for a period of five years.”

That is, we undertake to continue to supply the Commonwealth for a further five years, with 94 net titre sugar, as hitherto, at 3½d. per lb.

We are fully aware of the hostility of certain powerful newspapers in the South, who, through ignorance of the facts or because of their failure to outgrow opinions formed or policies advocated in pre-Federal days, oppose bitterly a continuance of the present Sugar Agreement.

National Security Ensured by Sugar.

To me it was not a matter of wonder in pre-Federal days that people in the South, who believed in the ideal of White Australia and knew the history of America, should regard the Queensland Sugar Industry, with its kanaka labour and large plantations, as something of a menace; but it is surprising that there are Australians to-day who do not realise that White Australia has passed from an ideal to an actuality through the agency of the sugar industry, that both the kanaka and the large plantations have long since disappeared, and that in their stead are small farms owned and worked almost exclusively by men of their own colour, race, and ideals; and this industry to-day, far from becoming a menace, has become the greatest bulwark of our national safety.

Australia is the one country in the world to-day that grows sugar-cane successfully and manufactures it into sugar by white labour and under white labour conditions, while the sugar industry is the only industry suitable for our thousand miles of tropical coastal lands, the most vulnerable part of Australia.

What the Federal Royal Commission on Sugar Said.

The Royal Commission appointed by the Federal Government in 1911 did the sugar industry and Australia a great service by presenting to the public many important truths. Had that report been carefully studied, even by newspaper men and politicians, the present hostility would not now exist.

The Commission said, and we wish to emphasise those views to-day:—

“Unsettled areas in the tropical parts of Australia are not only a source of strategic weakness; they constitute a positive temptation to Asiatic invasion. The ultimate, and, in our opinion, the effective justification of the protection of the sugar industry lies beyond the question of industry or wealth production. It must be sought in the very existence of Australia as a nation.”

The Sugar Industry and National Defence.

We say emphatically that in the defence of this Continent and the maintenance of White Australia, the preservation and advancement of the Queensland Sugar Industry are involved. We believe that the industry can only be maintained and extended so as to provide all the sugar Australia requires, by one or other of the methods now advocated.

According to Press reports a few days ago, you were speaking on defence and the importance of the Navy. Battleships are necessary; but is not a girdle of white settlers round Australia, producing an important article of diet, equally valuable? The new sugar-mill, costing half a million, about to be erected by the Queensland Government to open up the jungle lands of the Tully River is as good an investment for defence as a modern battleship, for it will settle men there who will be ready to fight if needed. I am right in saying that the first Contingent to leave the mainland during the late war was despatched from Townsville, North Queensland, going to Papua and Thursday Island.

The Queensland Government has invested in mills one and a-quarter million sterling. We are spending two millions in completing the North Coast Railway, which, with the settlement that the sugar industry alone can maintain, will be of great value in case of a threatened invasion; but, of course, such railways without the settlers would be an advantage to the invader.

Australia Should be Self-contained.

Our second great claim for your consideration is that Australia should be self-contained. We can, and should, produce all we require, not only for the present population of five and a-half millions, but for a population of fifty millions.

The Queensland Government and the Industry—Beneficial Effects of Stabilisation.

I have mentioned that the Queensland Government has large sums invested in sugar-mills and railways in sugar districts. Notwithstanding this, our greatest concern is for the grower and the worker in the tropics. We have passed legislation to encourage and protect those two sections in so far as State legislation can do that. Neither the need for this legislation nor the history of the early hardships of those engaged in cane-growing need be gone into now; but I want to say that, generally speaking, prior to the present system of control the grower did not receive

a price for his cane which enabled him to pay decent wages, live and keep his family in a moderate degree of comfort, and at the same time return to the soil in the form of manure some of that which he took away from it. Whereas, during the last three years, under the agreement the industry has been stabilised, the grower has received a price for his labour which encouraged him to clear and plant further areas, and to manure and better cultivate existing fields. The increased area in 1921 was 40,000 acres, and at the same time the manufacturer was enabled to install much-needed new machinery to bring his mill to a better state of efficiency, over one million sterling having been expended by the millers during the last three years for this purpose.

For the first time in the history of the industry those engaged in it knew where they stood for at least three years. The term was altogether too short, for it should be realised that felling, burning, and clearing Northern scrub lands is slow and expensive work.

Sugar-cane, unlike many crops, remains in the ground from three to six years, while a modern sugar-mill, with a tramway system complete, costs anything up to half a million sterling.

Room for Expansion in Queensland.

We have hundreds of thousands of acres of land with climate and rainfall suitable for sugar-growing equal to that in any part of the world, and this is a point worth remembering, quite apart from the vital question of keeping our Northern coastal belt peopled from a defence point of view. You will perhaps be surprised to know that during the seasons 1915 to 1920 Australia spent sixteen and three-quarter millions sterling in importing sugar, excluding duty, and that the price for these importations was £9 7s. 6d. per ton higher than that paid to the local producer under the present Agreement.

Stability and Security Ensure the Cheapest and Best.

The immediate advantage to Australia resultant from the present Agreement is that we are now producing in Australia all the sugar that Australia requires. We guarantee to do that if the Agreement is renewed at the reasonable price to the consumer as set out in the resolutions.

It can be shown that, while the present system of control has been advantageous to the producers by giving stability and security to the industry during the period, the Australian consumer received the cheapest and the best sugar in the world.

An Illuminating Comparison.

A comparison of the world's prices, which I furnish herewith, shows that the Australian public, under the present system of control, saved twenty-five millions sterling, as against paying world's parity prices. At the time of entering into the present Agreement to sell our raws at £30 6s. 8d. per ton, Mr. Hughes said that the cost of importing a similar article was over £60 per ton. It was the comparative cheapness of Australian-grown sugar under this system of control which enabled the Australian manufacturers to export articles made from or containing sugar to the value of over seventeen millions sterling.

In the light of these figures, I am not surprised that Sir Henry Jones, in writing to the Australian Sugar Producers' Association, under date 6th April, 1921, should say:—

“We are not up against the Australian sugar industry. We know quite well that we must pay a price that will enable the sugar to be grown by white labour, and we are quite willing to do this. In so far as the Australian market is concerned, it does not matter to us what we pay for sugar. As regards the export market, we are absolutely in agreement with the motion that was passed at your meeting concerning rebates on imported sugar required for manufacturing purposes and re-exported in manufactured form. An arrangement such as this would, undoubtedly, be of very great assistance to the Australian fruitgrowers. We think efforts should be made to enable the fruitgrowing industry and the sugar industry to be carried on in harmony, each to help the other, and we see no reason why these two great industries should not be carried on side by side—let them live and let live.”

The following table (figures compiled from "International Sugar Journal," England) shows the comparative prices in Australia and England:—

			Australia.		England.
1915	..	..	£25	..	£27 to £32 per ton
1916	..	..	£29 5s.	..	£34 to £41 per ton
1917	..	..	£29 5s.	..	£46 15s. per ton
1918	..	..	£29 5s.	..	£57 15s. per ton
1919	...	..	£29 5s.	..	£57 15s. to £66 per ton
1920	..	..	£49	..	£66 to £160 per ton

Australian sugar covering all charges.

This delegation agrees with those sentiments entirely. We believe the two industries should work in harmony and, above all, that Australia should be self-supporting.

There are many other important facts concerning both manufacturer and grower that delegates will put before you, but I again emphasise the fact that in the preservation and expansion of the sugar-cane industry of Queensland lies the maintenance of White Australia, and, as already stated, to a very great extent, the defence of Australia.

"We say emphatically that in the defence of this Continent and the maintenance of White Australia the preservation and advancement of the Queensland Sugar Industry are involved. We believe that the industry can only be maintained and extended so as to provide all the sugar Australia requires by one or other of the methods now advocated.

"According to Press reports, a few days ago you were speaking on defence and the importance of the Navy. Battleships are necessary, but is not a girdle of white settlers round Australia . . . equally valuable?

"The new sugar-mill, costing half-a-million, about to be erected by the Queensland Government to open up the jungle lands of the Tully River, is as good an investment for defence as a modern battleship, for it will settle men there who will be ready to fight if needed.

"I am right in saying that the first Contingent to leave the mainland in the late war was despatched from Townsville."—*Hon. W. N. Gillies to the Prime Minister (Hon. S. M. Bruce, M.C.), in the course of his (Mr. Gillies') advocacy of Commonwealth consideration for the Sugar Industry at Melbourne, on 2nd March.*

Unity of All Sections.

I am aware that there are differences of opinion regarding the policy of Government or State control of industry, but the delegation before you is made up of all shades of political thought, and it is at one on this question as far as the sugar industry is concerned. Several members of your Government have said time and again that the circumstances of the sugar industry are such that this form of Government control is absolutely necessary.

In conclusion, I desire to respectfully press for an early consideration of the whole question, for the present Agreement is to all intents and purposes at an end so far as the producers are concerned. The crushing season will start very soon, and there is a general feeling of uncertainty in the minds of those engaged in the industry as to their future.

Unacceptable Proposal—Risk of Fiscal Failure.

With regard to your statement that a special tribunal for the sugar industry would be appointed to determine rates of duty, and setting out other conditions, I can assure you that such proposals are not acceptable to the delegates, nor to a

single Queensland member of the Federal Parliament, for all those who are familiar with the ramifications of the industry know that to simply erect a tariff wall is not to give protection to either producer or consumer. If your statement yesterday is your final word *re* the Agreement—and I hope it is not—then let me urge on you the favourable consideration of the alternative scheme set out in the attached resolutions.

An Alternative Scheme.

This scheme, while guaranteeing the consumer 1A refined sugar at 4½d. per lb., relieves the Commonwealth Government of any financial obligation. The delegates, whilst anxious to return, are prepared to remain in Melbourne whatever time is necessary to suit your convenience.

THE SUGAR PRODUCERS' VIEWPOINT.

The Merits of the Agreement and Its Justification.

Mr. G. H. Pritchard, Secretary of the Australian Sugar Producers' Association, said that Mr. Gillies had stated the foundation of their case, especially directing his remarks to the national importance of the industry, and with reference to the resolutions carried in Brisbane, the speaker proposed to deal with these remarks *seriatim*. He would endeavour to show the merits of the Agreement and to establish a complete justification for it. There were two cardinal points to be kept in view, first to stabilise the industry, and secondly to stimulate production. This had been the original idea when the Agreement was brought before the present Prime Minister's predecessor, and he was glad to be able to say to-day that both of these desirable objectives had been conspicuously achieved. He desired to point out, however, that the circumstances obtaining in regard to the Sugar Agreement were somewhat different to those obtaining in regard to any other thing. In the first place they had the Sugar Acquisition Act under which the Queensland Government acquired the whole of the sugar produced in the State. Secondly, they had the Regulation of Sugar Cane Prices Act which fixed the price of cane. They had the Industrial Arbitration Act and the Industrial Arbitration Court under which is fixed matters relating to labour, and the conditions under which the workers perform. There was also the Workers' Accommodation Act. It was quite realised that some of the industries had some of these component governing statutes, but he did not know any one which had them all. It seemed to him, therefore, that so long as those statutes existed the raw sugar miller should know where he stood.

How the Consumers are Protected Under the Existing Agreement.

He also wished to point out that Government intervention was initiated to protect the consumer. In 1920, they sold their sugar to the Commonwealth for £49 a ton, while the price in Cuba two months later in the same year was £137 10s. As a further evidence of the good bargain this was to the consumers of Australia the Customs records would show that in 1920, 100,000 tons of sugar were imported, which cost the Commonwealth £60 a ton, and in 1921, 84,470 tons which cost £36 15s. 8d., without duty—because after the Agreement was made he understood the Government suspended the charging of duty—therefore he thought that with these figures standing out like a beacon light it could not be contested that when the Prime Minister made this Agreement he did an eminently good thing for the consumers of Australia, and he really did not think that there could be a more emphatic endorsement of the foresight and wisdom of Mr. Hughes in making this Agreement than this.

The Voluntary Sugar Pool Proposal.

Regarding the resolutions at the Brisbane Conference, the first proposal was that a sugar pool be established for a period of five years—a voluntary pool and not a compulsory one. As the Commonwealth Government had done much to assist other industries by way of pools, it seemed only reasonable to assume it would be favourably disposed to regard any proposal in connection with the sugar industry.

The second resolution was a machinery one only by which the sugar would be acquired—also to make provision to include New South Wales sugar in the pool; and there should be no difficulty in the Colonial Sugar Refining Company bringing in the product of their three mills. Resolutions Nos. 3 and 4 were the ones which concerned the Commonwealth directly.

No. 3.—While the pool is in operation, the Commonwealth Government to prohibit the importation of black-grown sugar except so much as is required from time to time as determined by the pool to make good any Australian shortage; this embargo to be applied subject to conditions stated in Clause 4 relating to price to be charged to the consumers.

No. 4.—During the currency of the pool 1A refined sugar to be sold at such a price as will ensure that the retail price of refined sugar to the consumer shall not exceed 4½d. per lb. in capital cities.

Continuance of Tariff Protection.—Safeguarding Consumers.

They were asking for a continuation of the existing embargo against the importation of black-grown sugar, and that produced under black-labour conditions. In exchange for that concession they undertook that 1A refined sugar would be produced so that it could be retailed at a price of not more than 4½d. per lb. They were prepared to give that safeguard, and it therefore appeared to him that they were putting up a perfectly sound and proper proposition. He would submit that while their undertaking ran concurrently with the embargo the Commonwealth Government ran no risk whatever. If they failed the embargo could be removed. They were producing all the sugar that was required for the consumption of the Commonwealth, and were thus saving the money value of that sugar getting out of the country. The chief overseas source of sugar was Java, and the Commonwealth had very little trade with Java, and consequently any sugar purchased from them meant a trade balance against us. The speaker then went on to refer to the poisonous remarks passed by the Melbourne Press. The interests which he represented, however, were asking for no concession whatever, neither did they desire any financial aid from the Government. They would provide all the necessary machinery. This he considered made a conspicuous difference between the present and many other schemes put forward. He desired to labour this. He did not find anybody else outside Melbourne saying the things that appeared in the Melbourne Press—they were not true.

Queensland's Greatest Agricultural Interest.—An Australian Industry.

In conclusion, Mr. Pritchard emphasised the fact that the sugar industry was one of the greatest possessed by Queensland. Summarising the position he said that it was an Australian industry pure and simple. There never had been a more pronounced national note struck than by the Commission appointed in 1911. The salient features of this were: Burden of the White Australia policy had practically been borne by the sugar people in Queensland; it was the only industry which was successful in the tropical north. It had been pointed out that the wages in the sugar industry were £6,000,000 per annum. The production of sugar had been a great factor in building up industries connected with jams, fruits, milk, &c., the exports of which had amounted to £17,000,000 per annum. Before the war these had been infinitesimal in comparison, and this was because sugar could be supplied to the manufacturers in Australia at a cost which enabled them to compete in the world's markets—in Britain, America, and India, with the Governments of which countries they had contracts. The Sugar Agreement had certainly achieved this purpose. Australia produced all the sugar required for home or export trade. The producer received only 3½d. for his sugar, which was a very necessary thing to remember. They had been blamed for sugar being 5d. per lb., but the difficulties were not realised, and the price could be easily justified. The value of the Australian output of sugar last year was £9,000,000. If that were taken as an annual income and capitalised at 5 per cent. it would represent the vast sum of £180,000,000, thus illustrating the great benefits to Australia in more ways than one. It was estimated that more than 100,000 persons depended upon the industry, and over 20,000 men were employed. The capital invested amounted to £16,000,000—£6,500,000 for land and improvements, £6,000,000 for machinery, and £3,500,000 for refineries, not including the necessary working capital; he wished to emphasise this fact also. To erect and equip a new mill cost in round figures £500,000; this was a very different thing to a butter factory. There was this difference in particular—i.e., that once you spent such a large sum of money it was there and you could not shift it. If the sugar industry were destroyed it would be so much scrap iron. Further, Australia was the only country where sugar was produced by white labour.

The Domestic Aspect.

Regarding the high price of sugar, the weekly domestic expenditure on sugar was less than any other leading item of food in the family budget. Mr. Piddington, after investigation, had given it that 5½ lb. was necessary for a man and his wife and family of three. Even on the old price that was 2s. 9d. a week; 6d. per week could now be taken off that. He could not but think that a lot of this complaint about the price of sugar was simply passed from mouth to mouth without any serious analysis of what it really meant, and was becoming a sort of catch cry. Mr. Gillies had told them of the immense advantage to Australia through having the sugar industry here that could not be refuted. Between 1915 and 1920 the comparative prices of sugar in Australia and England (from figures taken from the Royal Commission on sugar—"International Sugar Journal") were as under:—

			Australia.		England.
1915	..	..	£25	..	£27 to £32 per ton
1916	..	..	£29 5s.	..	£34 to £41 per ton
1917	..	..	£29 5s.	..	£46 15s. per ton
1918	..	..	£29 5s.	..	£57 15s. per ton
1919	..	..	£29 5s.	..	£57 15s. to £66 per ton
1920	..	..	£49	..	£66 to £160 per ton

Australian sugar covering all charges.

Assuming that the Australian consumption was 180,000 tons a year, Australia saved £25,000,000.

Thriving Queensland Towns Supported by Sugar Industry.

There was one other fact, that a number of really important towns depend solely for their existence upon the sugar industry. The speaker remembered Dr. Earle Page having been reported in the paper to have said that during his tour through Queensland that fact had struck him very forcibly. There was Bundaberg and Mackay. The latter had nothing else but the sugar industry and Bundaberg was practically similar. These were two cities typical of many smaller ones.

Home Markets.

There was another feature to which he specially desired to invite attention. Sir Henry Jones had said that he found the Australian market was the very best market for his jams, and he, the speaker, wished to remind them that Queensland, and particularly North Queensland, was one of the finest markets for the goods produced in the Southern States. He had there a leaflet from the Royal Show last September, showing the "Wyreema" working at the wharf discharging cargo from the Southern States and loading sugar to be sent to these States from Queensland.

Immigration and Decentralisation.

The Prime Minister and his colleagues he was sure understood the position and could assist them. It would help solve the immigration problem, and in that way it was a magnificent adjunct in considering the policy of populating this large continent. Queensland stood behind the sugar industry in every shape and form, and he was sure would rejoice if it heard that they had been able to arrange terms satisfactory to the sugar producer.

THE CASE FOR THE CANEGROWERS.

A Pre-Federation Promise.

Mr. T. A. Powell, President of the United Canegrowers' Association, expressed regret that the Government had decided not to renew the Sugar Agreement. He would like to congratulate the Prime Minister upon the published reports of his recent utterances, expressing his sentiments regarding the White Australia policy. He might also remind him of the fact that when the framers of the Constitution asked the people of Queensland to come into the federation it was on the express understanding that Queensland's interests regarding the sugar industry would be protected. Also, it was the vote of the sugar representatives of Queensland that enabled federation to be brought about; he therefore hoped that the people of the Southern States could be relied upon to stand to the contract that was entered into in years gone by.

Holding the North.—National Security.

He further referred to the fact that according to the last census the population of Herbert had increased by 15,000 people, and also that they had thousands and thousands of acres of good land in Queensland that was simply crying out for population. Further, that within a few days' sail there were millions and millions of coloured races merely waiting an opportunity to come along, and that if the people in the South had everything they wanted they should also see that the people in the North received a fair deal. The sugar industry was a unique one—there was only one purchaser. It was not, for instance, the same as the wheatgrower; they had to send their cane to the mill to be crushed and manufactured into sugar. He would like to read an extract taken from the report of the 1912 Commission—

“The supreme justification for the protection of the sugar industry is the part that the industry has contributed and will, we hope, continue to contribute to the settlement and defence of the Northern parts of the Australian Continent.”

A Fair Deal Desired.

When Mr. Hughes was approached in 1920 for the present Agreement, one of the questions had been that if he granted the Agreement could they supply the Commonwealth requirements. They had told him they could, and it was the first time in the existence of the industry that canegrowers had had a fair deal. The land had since then been taken up by settlers. The railway line had just been completed from Rockhampton to Mackay. He had on one occasion seen one of the settlers and his wife carting cane to the railway in a waggonette and buggy. He did not think it fair for any Government to do anything that would injure a class of people like this, as they were the class we wanted in Australia, and they wanted to get on as a white nation. All they asked for was a fair deal. The speaker also referred to the other industries depending on sugar. He hoped the Prime Minister would take this into consideration, also all the other points which had been put to him. They urgently desired early consideration of the question, and a decision as soon as it could possibly be given.

The Financial Risk of Altered Conditions.

Mr. Alexander Innes, Chairman of the Mackay Sugar Producers' Association, said that since 1915 the Queensland sugar crop had been acquired by the Queensland Government and passed on to the Federal Government, who had dealt with it throughout—as regards finance, &c.; that covered a seven years' period. The termination of the Agreement would bring into force again a complete set of new conditions. The financing of the industry was done by the sugar mills, and the extent to which this obtained could be judged from the fact that from the commencement of this year from 25 per cent. to 30 per cent. of the growers had applied for an advance. For the first two months of the year £2,000,000 had been advanced by one institution—this was apart from the sums they had advanced as fixed sums to the mills and other institutions. With these new conditions coming into operation it was necessary for them to know as millers where they stood. On behalf of the millers and growers, he would ask the Prime Minister to give as early a reply as possible. In reply to the Prime Minister, the speaker said that the £2,000,000 referred to was for current crop requirements and for mill requirements, and apart from permanent advances.

The Uniqueness of the Industry and the Question of Tariff Protection.

Mr. W. H. Doherty, Secretary of the United Canegrowers' Association, emphasised one or two points touched upon by previous speakers. In particular that of Mr. Gillies's remarks *re* the uniqueness of the Queensland sugar industry's position as compared to other Australian agricultural industries. He had heard the previous day the Prime Minister in Parliament say that he was prepared to give the industry adequate protection. They could not accept any amount of tariff protection as an adequate protection to the sugar industry, as it was here that the uniqueness of the position became apparent. In other agricultural industries, when, as with the farmer, there were droughts, he obtained the benefit of that rise; in the sugar industry they had no corresponding rise. If during the present year they produced half of the sugar requirements, the price would not be increased for the reason that they had black-grown sugar imported into this country to make up the shortage. That was one of the serious phases of the industry. It was evident that, although production in such an event would decrease, the cost of producing would

be just as great, or possibly greater than if they had an average crop. In a year of under-production, if there was no supervision over the importation of sugar, the temptation was to import sugar as required. If in the following year as much sugar as was required was produced in Australia it would be our sugar and not the imported sugar that would be carried over.

Royal Commission's Report.—Growers' Inadequate Profits.

With regard to some form of supervision, he would read a few remarks by the Royal Commission of 1912 in their report:—

“Unfortunately, when we come to the growers we find a very different story.

While the millers and refiners make handsome profits, the profits of the growers as a class are inadequate. A proportion of the growers as growers do well. The character and situation of the land, the price which was paid for the land, good fortune as regards seasonable rainfall and immunity from pests, floods, or cyclones, the exceptional ability or industry of the grower himself, or the employment by the grower of members of his own family—all or any of these may operate, and have operated, in favour of particular growers to secure good results. But the growers as a class do not, in our opinion, receive their fair share of the profits of the industry as a whole. Nor do they receive that adequate return on their capital outlay which it should be one object of a protective system to ensure. On careful analysis of the evidence submitted by the growers, the large majority were at one in maintaining that an increase in the price of cane was imperative.”

That report, of course, was given in 1912, and while it stated there that the millers and refiners had handsome profits, since then the profits had been reasonable and fair, and they wished that condition of affairs to continue.

The Risk of Retrogression.

He also wished to point out that if they had to rely on a duty they would be going back to the condition of things existing at the time that Commission took its evidence. Sugar was then at the lowest price on the world's markets. They did not wish to go back to that condition of things, because it placed the grower in the position that he did not know where he was. The objection to a fixed tariff was that they had a fluctuating price for cane—one year perhaps the price was adequate and next year possibly the price might fall £10 a ton. Their cane had to fall in proportion, and it had been grown by labour that had been fixed at a price when cane was at a decent price. It was not in any way on the same basis as other Australian industries.

The Viewpoint of New South Wales Growers.

Mr. B. McDonough, representing the growers of New South Wales, said that the interests of the northern part of New South Wales were practically identical with those of Queensland, and an agreement entered into by the people of Queensland would be acceptable to those of New South Wales. During the currency of the present Agreement was the only time the growers had enjoyed any form of prosperity. His people would be very disappointed if some assistance were not given by the Government. He also would be disappointed, as at the present time they were spending a lot of money in their district; for this reason they would be glad of early consideration of the matter.

THE PRIME MINISTER'S REPLY.

The Prime Minister, in reply, said that he realised the deputation had come a very long way to see him and to place their views before him as representatives of the Government. In view of that fact, he was following a somewhat unusual course. As Mr. Gillies had pointed out, when a Government had a vote of censure over its head it was generally considered more correct that it should not receive deputations or take any action whatever. In this case, however, he thought perhaps it was only right he should see them and give them an opportunity of placing the position before him as they saw it. There were no members of Parliament present other than the President, who introduced the deputation, but he thought it was only fair to the members of the Federal Parliament to point out that there was a generally expressed desire on their part to attend, and it was at his request solely that they were not present. It was only necessary to have it introduced and then they could set out their case.

The Industry, an Australian Asset.

With regard to what they had said, there was a great deal which went to show the value of the sugar industry to Australia. He and his Government fully realised that it was imperative it should be carried on and should prosper. In the speeches made they had also given a great number of facts as to the value of the Agreement terminating on 30th June, both to the industry and to the people of Australia generally. Some remarks were also made as to the poisonous remarks that were being made in the Press in the South regarding the industry. They need have no apprehension as to the Government being influenced by comments of this character. They could take his assurance, and he would also tell them that, during the recent campaign for his own part—he did the Southern States, mainly Victoria, Tasmania, and South Australia—everywhere he went he put the case to the people for the sugar industry's protection and preservation in Australia as being vital to our White Australia policy, and he ventured to say that, generally speaking, the people in the South realised that it was essential, and they had no prejudice against the industry itself.

Consumers Benefited by Agreement.

He also dealt right through the campaign with the question of the Agreement which expired on 30th June next. He put the facts with regard to that Agreement and he put a large number of facts they had quoted to-day. He had told the people in the South that the Agreement was one which had conferred a very great benefit on the sugar consumer of Australia, and, without hesitation and notwithstanding the great clamour that was going on in some parts, that that Agreement had been to the benefit of the consumer. He wanted them to realise that the Government approached the question with no prejudices because they had spent some of their time in the South. They had fully realised the importance of the industry to Australia—particularly in connection with our White Australia policy.

Reasonable Safeguards for a White-manned Industry.

That was the Government's view. But the Commonwealth Government, he would remind them, was the Government of the Continent of Australia. Mr. Gillies was connected with the Government of the State of Queensland, and he looked at this question with the view of Queensland and of the things which Queensland desired would happen; but, unfortunately, he (the Prime Minister) was afraid the Commonwealth Government would have to look at it not only from the point of view of Queensland, but from that of the whole of Australia, and hold the balance evenly between all the States. He, the day previously, had dealt with the question of sugar, and therefore was not in quite as embarrassing a position as otherwise he might have been, because he could say something to them to-day that was not anything new. He had not at hand exactly what he said yesterday, but he would say it to them again. He had pointed out the value of the industry. Also he believed that the people of Australia as a whole realised that reasonable safeguards had to be given to protect this white-grown industry against black-grown sugar competition. The question was how that safeguard was to be brought about. It was one about which there might be some difference of opinion. He had said that the Government (and he represented the Government) was not prepared to renew the Agreement which expired on the 30th June. He did not intend that afternoon to deal with the reasons for arriving at that decision. It would take some time and he did not consider it was the proper time to do so. He hoped to visit Queensland in the near future, and would then be prepared to deal with the whole question, and, whether they agreed with him or not, they would certainly find he would not shirk the issue. He would then tell them why his Government was doing whatever they may decide to do.

Non-renewal of Agreement.

Without dealing at length with the Agreement, he could put it broadly and say that while the Government realised it had been of considerable benefit to Queensland and the industry—to which eloquent testimony had been borne by Mr. Gillies and Mr. Pritchard—and while during the period it had operated it had been of great benefit to the people of Australia as a whole, the abnormal circumstances which then obtained had now disappeared, and that Agreement as it was in existence under those abnormal circumstances, if it were continued to-day under normal conditions, would be giving to the State of Queensland preferential treatment and better conditions than we are prepared to extend to any other industry. That, of course, was a thing the Government could not possibly do. The members of the Deputation might disagree as to the view the Government was taking, and would argue it out on their views; but that was their view and it was why they would not renew the Agreement.

A Tariff Alternative.

As to the indication he had given yesterday on behalf of the Government as to the manner in which they considered the industry should be safeguarded: it was through the medium of the Customs tariff which was in existence in Australia to-day. There were many industries besides theirs in Australia that needed safeguarding against outside competition, but these were always safeguarded by means of the accepted policy of Australia to protection, and was the proper safeguard for the sugar industry. All he could say to-day was that, and he would point out to them that this was the broad outline of what the Government's actions in the future would be. When they had an opportunity to consider the whole question fully, they would define exactly the Government's position and policy; and, further, they would give them this assurance: that they would do it as soon as possible. As soon as it was possible for them to accomplish the necessary work they would deal with the matter, because they could see the position the industry was placed in, in that it was not certain as to the basis of its future operations. He would give them this further assurance: that the Government would tolerate no political finessing. They would make a commencement as soon as they were able to do so.

There was no more that he could say; but, placed as he was, and in view of the fact that the present Government had held office under three weeks, it was unreasonable that they should be asked to say any more at this stage. All that had been said by the deputation would receive full consideration.

The Prime Minister then explained that the reply he sent to the wire asking for the deputation was sent in their interests, because it appeared to him it was a very long way to come when all he could say was that they really must await the Government's policy. He realised, however, why they wanted to come. He did not wish to speak for the whole of his Government, but he believed he had had sufficient to do with this industry and the problems that surrounded it to say that the difficulties were fairly well known to him. At the same time, when he found they still desired to see him, notwithstanding the fact that it was so early in the life of the new Government, he acceded to their request, and could only say he was pleased to see them, to listen to them, and get any assistance he could in arriving at a correct solution of this matter.

TREATMENT FOR FISTULA.

When a fistula on withers is forming, it is customary to apply a blister or hot fomentations. This on rare occasions appears to effect a cure, but in the majority of cases it hastens the swelling and brings it to a head. After it has broken, surgical treatment is required.

The next thing to find out is the direction and depth of the fistula. This is done by using a flexible probe, some 8 or 9 inches in length. Free drainage must now be given by opening along the full length of the probe, or if thought advisable an opening can be made at the lower part of probe, and a seton of tape or other material passed through and tied on the outside. A seton keeps the wound open and assists in draining the cavity, but the first method of opening up is generally found more satisfactory. Both sides of the withers should be opened, if necessary, and any necrosed (dead) tissue removed. The top of withers should not be opened crossways—from side to side—because there is a ligament which runs along the middle line of shoulders from the head—if cut causes serious consequences.

The chief points to remember are—free drainage, the removal of all dead tissue, and the prevention of pockets where pus can accumulate.

The following lotion should be used every third day on the fistula after it has been opened up, until four applications have been applied:—

Corrosive Sublimate	..	..	..	..	..	..	$\frac{1}{2}$ oz.
Methylated Spirits	..	..	..	..	..	..	1 pint

This is best applied by soaking some cotton wool or other absorbent material with the lotion, then packing the saturated cotton wool in the fistula. This treatment can be repeated if necessary after ten or fourteen days' interval. Knives, probes, &c., should be thoroughly disinfected before using by placing them in boiling water or some disinfectant such as carbolic acid, Condy's fluid, &c. Knives and other steel instruments should not be allowed to come in contact with the corrosive sublimate solution.—Major A. H. Cory, M.R.C.V.S.

SUGAR: FIELD REPORTS.

The Northern Field Assistant (Mr. E. H. Osborn) reports under date 16th March, 1923, to the Bureau of Sugar Experiment Stations:—

Mourilyan.

After a very successful season's run, this mill is now being overhauled and added to in anticipation of a large crop this coming season. Although the January rainfall had been rather light, the cane in general looked very well.

Some very fine cane was noticed in the area lying between the Cowley line and the North Coast Railway, in most cases being very clean and showing evidence of thorough cultivation. Among individual growers in the Mourilyan area is Mr. Schilling, who is taking a great interest in the newer varieties of cane. He has now planted out some 7 acres of Q. 813 and about 2½ acres of H.Q. 458, and has had a very good strike. If the tonnage and density of these varieties are good upon this particular soil, Mr. Schilling intends planting a larger area. As the mill chemist is always ready to give information on analyses of canes and other matters to growers, the result of this extension will be of much interest to other local farmers. Some very fine crops of beans were seen. Unfortunately, the high price of landing lime makes it too dear an item now. The completion of the North Coast line will, however, soon change this.

South Johnstone.

Weather conditions were ideal for growth. Some particularly fine Badila was noticed upon Mr. M. Darvenera's river flats. One 12-acre block is just twelve months old, and shows 7 or 8 feet of Badila true to type, which would probably now cut over 40 tons per acre. Bar floods or cyclones, a 60-ton crop should be cut here later on. Another 18 acres were cut in July and replanted in September, and will also develop into a good crop on its present appearance.

Further up No. 6 Branch a splendidly even patch of cane is standing upon this red soil country. In this particular locality all classes of cane, from plant to even sixth ratoons, look very green and healthy, and carry a vigorous growth.

Among other red soil areas also showing up well is that known as Miskin's Points, consisting of, say, 300 acres of really good land. Some splendid cane was noticed in the area that lies east from Miskin's towards Stewart's Creek. On No. 7 branch there is an area about the same size carrying fine cane. Upon Mr. J. Velouta's farm is a patch that was cut in September and replanted in October, now carrying good cane. Although this cutting and replanting straight away may appeal to a grower with new and rich ground, it is a practice that will surely result in soil exhaustion.

Nerada Line.

Cane, generally speaking, looks better than it has done for some years. So far, with the exception of a very slightly affected patch near the 12½-mile, the area seems free from grubs. Some very good D. 1135 plant was noticed growing upon an area that was formerly grubby. On No. 1 branch some very good cane was noticed on the alluvial flat country. Most of the country inspected was very clean and free from weeds.

Maria Creek Soldiers' Settlement.

Since my last visit this centre has gone ahead rapidly, and is now quite a compact little township, containing a school with an attendance of about thirty, and two general stores. As one of these stores delivers its goods by means of a motor lorry, it will be easily understood by older visitors to the district how much improved are the roads. There are now eighty settlers, of whom twenty-five are married, and mostly living in the compact little houses built by the department. Most of the cane (all Badila) seen was very fair. About 5,000 tons of cane were railed to the mill last season. Fourteen thousand tons are expected for the coming year. A very large amount of clearing and planting is now being carried out, so 1924 should show a large increase on all the above figures.

Among the farms that looked well were those of Messrs. Applegreen, Borden, Barrett, and McAlonan. These are situated south from El Arish, across Maria Creek, and are upon a reddish, slightly sandy volcanic soil carrying a fair number of small stones. Some good cane was also noticed on Messrs. Pedley's, McIntosh's, and

Carney's farms. This soil is mostly a deep yellowish or chocolate loam, and should last well. All these farms looked well and showed careful cultivation. Unfortunately, there are also a number of others that show that very little work has been carried out since crushing. As the settlers now know how rapid weed growth is in this unstumped and new country, they should certainly strive to keep down all weeds. No country will grow good cane and weeds at the same time. Referring again to the whole South Johnstone area, it can be safely said that it all shows signs of great prosperity. New houses and substantial cane cutters' quarters are to be seen throughout the district, and large areas of land are being got ready for the plough.

A very large number of farmers still avail themselves of the proximity of the Experiment Station, and are now growing small patches of such canes as E.K. 1, E.K. 28, H.Q. 458, Q. 903, 7 R. 428, Q. 813, D. 1135, and others. Most of these canes when seen were carrying a very vigorous growth and promised to develop into heavy crops.

Babinda.

Conditions were very favourable to the good growth of cane. Although backward in growth, the cane is of a very healthy colour, it has stooped out excellently, and carries a splendid top. In most cases the late planted cane and also the later cut ratoons looked better in comparison with earlier planted and earlier cut ratoons. The cold weather experienced about the earlier part of the crushing was responsible for this. Generally the cane is very clean, free from weeds, and shows careful cultivation.

Among the farms visited, Mr. S. H. Warner's property, known as 67, looked very well, some of the ratoons having had a dressing of 6 cwt. of mixed manure applied in two dressings. Prior to planting, another block of young plants was lined with from 4 to 5 tons of crushed limestone to the acre. This all looks very well. Upon Buckland's branch a great deal of work has been carried out. Very large areas are being stumped. Across the Russell River, Messrs. Harwood and Co. have about 100 acres of very fine deep yellowish alluvial planted, and looking splendid.

The Southern Field Assistant, Bureau of Sugar Experiment Stations, Mr. J. C. Murray, reports under date 28th February, 1923, as follows:—

Cooroy and Eumundi.

Since last visiting Cooroy a little extra work has been done in planting cane for the mill, but as yet the farmers are doubtful as to whether the haulage to the rail will not seriously cut down their profits. Much good land is available for sugar-cane growing, and, perhaps, if stable prices prevail, this will in time be connected with tramlines. D. 1135, as a young plant crop, is looking well, but H.Q. 285 and Q. 813 are also good canes for this area. Shahjahanpur No. 10 is also to be recommended.

At Eumundi there is more ploughable country than at the former place, the long valley running west from the township being very suitable for cane on a fairly extensive scale. Mr. Cook, a farmer in this locality, has a very fine showing of sugar-cane, including the varieties H.Q. 285 and Rappoe. Varieties to be recommended are Shahjahanpur No. 10, Q. 813, H.Q. 285, and D. 1135. Rappoe is not recommended, owing to its high susceptibility to "gumming disease."

The district seems fairly free from injurious cane pests or fungoid parasites, although small grub infestations are in evidence.

Nambour.

There is every chance of a heavy crop. On Petrie's Creek and the Maroochy River there has been a considerable influx of new farmers, who are working with energy and enthusiasm, and it is gratifying to note that most of them have first-class crops. The main problem in these localities is drainage, and the following remarks on the benefits of thorough drainage may be of use:—The most important effect of drainage on soil is that it makes it warmer. A wet soil is cold, made so on account of the cooling process of the constant evaporation which always occurs on wet soils. Warmth is very essential for the germination and growth of sugar-cane, and it is the coldness of a poorly drained soil, more than an excessive amount of water, that is responsible for unsatisfactory crops. Drainage allows the air to enter the soil. Air is a very important agency in making the soil productive. Plants must have air

or they will not strike. The soil bacteria that makes fertility cannot flourish without air. Although it may appear strange, draining a soil helps to conserve the moisture when it is most needed. In explanation of this, it might be stated that drainage lowers the main body of water in the soil, thus increasing the volume of soil above it in which the roots of the plant can feed. Plants use only film water, or that which lies round each soil particle, therefore the larger the body of soil above the water-table, the greater the feeding space, and incidentally the greater the available plant food. A soil is more friable after it has been drained than before, therefore it can absorb and hold more film water and its capillary action is also stimulated. So it is that a wet soil is dryer in a wet period, and more moist in a dry period than before it was drained.

Cane pests are not causing a great deal of damage on the Nambour area, although on the Maroochy River a small black beetle is appearing and attacking the cane underground, causing, in some instances, severe losses. Cane varieties that are making a good showing in the Nambour district at present are Q. 813, E.K. 1, E.K. 28, C.S.R. 1, C.S.R. 3, H. 227, H. 277, J. 247, Shahjahanpur No. 10, H.Q. 144, M. 16804, M. 1900 Seedling, M. 189, D. 1135, and H.Q. 285.

Farmers are advised to give these canes careful attention and observe them from a point of view of determining their resistance, susceptibility, or tolerance to disease. Striped leaf disease and gumming are showing in places in D. 1135, but as yet only primary symptoms of the former were in evidence.

A visit was made to the Mount Coolum areas. Great progress has been made here during the last two years, principally in the drainage of the swamp and the extension of the tramway through to the beach. That splendid crops of cane can be grown on the drained areas has now been proved, as about 14 acres planted on what was once a morass, is evidence. A motor tractor did the work prior to planting. Cane varieties that are looking very well in this district are Q. 813, E.K. 1, and H.Q. 285. Excellent fertilising results are being obtained with basic superphosphate on plant cane.

A visit was also made to Mapleton while in the Nambour district. The cane in this scenic area looks well, and a number of varieties obtained by Messrs. Story and Anderson from Bundaberg Sugar Experiment Station are making excellent progress. These canes are Q. 813, E.K. 1, Q. 970, Q. 1098, and Q. 1121. M. 1900 Seedling and H.Q. 285 are also making a very satisfactory showing.

Beenleigh.

Rain is badly needed in the Beenleigh district, although if the cane could get showers soon there would be a fair crop, especially with those growers who have continuously cultivated. During dry spells plenty of cultivation is imperative, as this keeps whatever moisture that is available in the soil. At Pimpama Island Mr. Heck is contemplating considerable extension of tramlines, which should greatly increase the district's output. This gentleman has brought his mill to a high standard of efficiency, a consideration which is always reflected in a farming community by an increased output.

Cane varieties making a satisfactory showing in the Beenleigh district are D. 1135, Q. 813, Badila, B. 208, and Mahona. The farmers are advised to concentrate on growing the two first named, with a small acreage of Badila and B. 208, provided the latter remains healthy. They are advised to discard most of the other canes that are not included in the above list, excepting any which stand out conspicuously, or newly introduced canes undergoing observation.

Marburg.

Very dry weather conditions prevail here, and the cane that is growing has had a serious setback. No large areas are under cane, the farmers being under the disadvantage of not having a local mill. However, the soil in this district is of an excellent quality, and good tonnages of cane could always be grown in ordinary seasons, provided the farmer kept above frost line.

Canes obtained from the Bundaberg Experiment Station include Q. 813, Q. 970, Q. 1098, E.K. 2, E.K. 1, E.K. 28, and Shahjahanpur No. 10. The drought, however, has been severe since these were obtained, and it is improbable that they will make a good showing.

Thanks are due to the different farmers met, for their invaluable kindness and courtesy.

CANE PEST COMBAT AND CONTROL.

The Entomologist of the Bureau of Sugar Experiment Stations located near Cairns (Mr. Edmund Jarvis) has submitted the following report dated 20th March, 1923, to the Director (Mr. H. T. Easterby):—

Field Experiments with Para-dichlorobenzene.

Experimentation with this fumigant was commenced on 17th January, when a plot of Badila (August planting) measuring 26½ by 66 feet (one-fifth of an acre) was treated with ¼ oz. injections, placed 7 inches deep, 12 inches apart, and from 4 to 6 inches from stools. The rows on this plot at Greenhills were fumigated on one side only, and when examined about a month later it was seen that the cane had grown vigorously, while the odour of para-dichlorobenzene was quite noticeable in the soil a few inches away from injections.

About one-third of the chemical had evaporated, so we may, I think, conclude that in the case of ¼ oz. doses situated at a depth of 7 inches, ten weeks or longer might elapse before complete evaporation. On 25th January a plot of first ratoons of D. 1135 (measuring 172 by 32 feet) growing on red volcanic land owned by Mr. P. Martinuzzi, at Meringa, was treated on each side of the rows with ¼ oz. injections, 1 foot apart, 6 inches deep, and 4 inches from the canes. Being situated on the brow of a high ridge, this land is usually more or less grub-infested each season, so that we hope to get conclusive results later on. At the time of injecting, these ratoons were about 3 feet high, and the soil was rather dry, while the depth of cultivation varied from 6 to 8 inches. A second plot, separated from the other by a check plot, and consisting of a strip measuring 14 by 472 feet, received similar treatment to the preceding, except that injections were placed 18 instead of 12 inches apart.

When examined about a fortnight later a smell of para-dichlorobenzene was noticeable an inch or so below injections (in the unworked subsoil) and the odour had penetrated upwards to the surface and throughout the soil in a lateral direction between the points of injection. In loose soil it could be smelt 9 or 10 inches away. About one-sixth of the crystals had evaporated. A month after application the cane on both treated and check plots had grown considerably, the leaves just meeting between the rows.

Effect of Fumigation with Para-dichlorobenzene on Sugar Cane.

About a fortnight after injecting close to cane stools it will be noticed that two or three leaves on plants here and there commence to wither from the point downwards. This characteristic browning, which appears mostly on the outer leaves, does not often extend farther than from 12 to 18 inches from the point, the basal portion of the leaf remaining green, and continuing to grow in a normal manner. Many stools, however, remain quite unaffected, although standing in the same row and having received exactly similar treatment.

This leaf-browning is probably due to one or more roots having been bruised or broken by the injector, thus allowing fumes of para-dichlorobenzene to enter the injured portion and affect the normal activities of the cellular tissue.

Fumigation of a plot of first ratoon Badila cane on block K. 4 at Greenhills was commenced on the 16th instant, injections being made on both sides of rows, 4½ inches deep, 12 inches apart, and 2 inches from stools. Grubs at the time of injecting were mostly in the second stage, while the cane was about 3 feet high.

Effect of Poisonous Plants on Cane-grubs.

The possibilities of this form of control have not been altogether overlooked, results of a more or less encouraging nature having occasionally been obtained by us. There is a popular impression to the effect that such plants as sorghum, white mustard, &c., if ploughed into the soil, will poison any grubs chancing to feed on the rotting foliage.

Experiments with both of these plants were carried out by the writer during 1921, when it was found that grubs after devouring young sorghum plants (about

9 inches high) and mustard leaves, were not injuriously affected, but on the contrary, appeared to be plumper and more active, as though such diet agreed with them. Similarly, when fed with the foliage of *Tagetes glandulifera* (Stinking Roger) they manifested increased vitality. In this case, however, our various experiments went to show that cane-grubs have a decided liking for the leaves of this weed, so that the plant might perhaps prove useful as a trap crop. Possibly this liking may furnish an explanation of various reports one hears about the freedom from grub attack noticed in those canefields around Bundaberg where "Stinking Roger" happens to be one of the commonest weeds. Whilst experimenting in 1922 with species of *Jatropha*, *Datura*, *Asclepias*, &c., our most promising results were obtained from plants belonging to genus *Crotalaria*. The possibilities of this genus as a factor in cane-grub control are still under investigation here, and may yield interesting data in the near future. In this connection, I should like to acknowledge assistance received from Mr. F. B. Coleman, of the Department of Agriculture, Brisbane, who has been good enough to forward me seeds of various poisonous plants for experimental purposes.

Carbon Bisulphide for Cane-grubs.

Canegrowers would do well to bear in mind that eggs deposited by the first brood of grey-back beetles (which started to emerge on 22nd December) were hatched about 10th January, producing grubs which at the present time are mostly in the second stage, while eggs laid by the brood of beetles which appeared later, about the middle of January, are nearing the end of the first instar. During the next few weeks fumigation of the soil with carbon bisulphide should be carried out on areas presumed to be grub-infested, the ground at present (26th February) still continuing in good condition for such treatment. Operations in this connection were commenced this season at Greenhills on 14th January, at a time when grubs were mostly in the first stage, or had just moulted into the second. The soil at that time was fairly dry, although moist enough to retard upward evaporation of the fumigant. On some of the blocks treated, many of the stools examined appeared to be free from grubs, or but slightly affected, while others gave decided evidence of infestation. Grubs for the most part were feeding among the surface roots, at depths varying from 3 to 5 inches, and although the ground was examined to a depth of 2 feet or more, none were found below 9 inches. No time should be lost while the cane continues small enough to get among, and grubs can be destroyed before large enough to work appreciable damage. In the event of heavy rain occurring, fumigation should, however, be discontinued for a few days, until excessive moisture has drained away, and left the soil sufficiently open for the fumes of bisulphide to freely penetrate in all directions. When examining a block thought likely to be grub-affected, several stools in various parts of the field should be dug around, in order to gain an approximate idea of the percentage of grubs per stool, of their size, and the depth at which they are lying.

The fumigant should then be injected an inch or two above them, care being taken to close the holes made, by pressing the surface-soil with the foot after each injection. When treating very young plant-cane injection on one side of the rows is sufficient, while for ratoon or early plant-cane it is often advisable to treat both sides.

Tachinid Fly Parasite of Cane Borer.

Our rearing of these parasites has been discontinued of late owing to difficulty in procuring borer-infested canes from which to obtain grubs for our cages. These flies do not appear to breed as readily in sticks of D. 1135 as in Badila, owing perhaps to canes of the former variety being thinner, less juicy, and containing a larger percentage of fibre. Canes of Badila retain their moisture for a longer period when placed in breeding cages than is the case with D. 1135, which, if transferred during hot weather, does not always root in time to prevent shrinkage of the rind. Occurrence of the cane-borer last season at Freshwater near Cairns has been brought under our notice recently by the manager of Hambledon Mill, and we hope in the near future to liberate tachinid flies at various infested centres in that district.

Other applications for parasites have been received from Mirriwinni, Mount Sophia, and elsewhere.

THE COMMON FRUIT FLY (*CHAETODACUS TRYONI*).

SOME ELEMENTARY FACTS.

In response to a request of the Tingoora Local Producers' Association, Mr. Henry Tryon, Government Entomologist, supplies the following elementary facts:—

1. The fruit fly, otherwise known as the fruit maggot fly, is a small two-winged insect with a body that, measuring about 3-10th inch in length, is pale reddish brown in varied tints, and conspicuously marked with a few yellow spots. The female fly, usually rather longer than its consort, has a top-shaped pointed hind-body, whilst that of the latter is semi-oval in outline.
2. This insect attacks almost every kind of cultivated fruit raised in Queensland. Also, some of those of our forests and scrubs, for it is an Australian native. Not all, however, are equally injured by it.
3. The fruit fly manifests four different phases of growth:—(a) the fly, (b) the egg, (c) the maggot, and (d) the pupa or chrysalis.
4. Its injurious connection with the fruit commences with the deposition of the egg therein, and thereupon until the next phase of life is completed, and it is then a full-grown maggot; it lives within it, being increasingly injurious as it attains this degree of development.
5. The egg, in establishing this connection, is placed by the female fly by aid of its penetrant ovipositor beneath the skin of the fruit assailed, either singly or in batches of several—eight or more; whilst, again, more than a single fly may thus place its eggs in any single fruit. The variation in the number of eggs that any fruit receives, and that may range from one to fifty or more, depends on its size and on its consistency at the time, amongst other features; whilst, again, there are characteristics in certain fruits that influence the measure in which further stages in the insects life may be realised, and whether even it may develop into a destructive maggot at all or may not.
6. Of the two successive life phases of the insect—that of the egg and that of the maggot—directly associated with the fruit, the length of the duration of each is dependent on varying factors, and therefore not always the same; the temperature influencing that of the egg, and this, and the food supply immediately available, that of the latter.
7. The egg phase usually lasts about three days, whilst the maggot may become full-fed in ten days.
8. When full-fed the maggot leaves the fruit ordinarily on this fruit falling to the ground, as it usually does as the result of maggots infestation, but sometimes, when the fruit remains notwithstanding attached, it still issues from it.
9. If free to do so, it thus enters a short distance into the soil; if not, it remains otherwise concealed.
10. On having done so it changes to the chrysalis or pupa, this life phase being attained within twenty-four hours or less. This ordinarily happens, but when the soil is very dry it apparently cannot so transform.
11. After an additional ten days (sometimes seven may suffice for this), the pupa has given rise to the fly again, and this, unless prevented, has found its way to the surface and into the free air.
12. The fly feeds upon sweet substances of many origins, including the nectar yielded by certain flowers.

Conclusions.

(a) These facts, pertaining to the common fruit fly of the State, will explain its rapid increase with the progress of the seasons.

(b) Again, the existence of fruit being necessary for the fly's existence, and its actually for a time in its life becoming voluntarily imprisoned therein, will suggest not only a means of control arising from this circumstance, but how it can become disseminated through man's agency. Nature, it is true, places limits in its numbers. Its active life and developments are, in fact, then, determined by the lower winter temperatures of the southern and of the more elevated northern parts of the State, and again it has its parasitic and predatory foes. But notwithstanding the fruit-growing industry, whilst it provides the opportunity for its increase, also provides that for exercising measures for its subjugation.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF FEBRUARY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING FEBRUARY, 1923 AND 1922 FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Feb.	No. of Years' Records.	Feb., 1923.	Feb., 1922.		Feb.	No. of Years' Records.	Feb., 1923.	Feb., 1922.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
Atherton ...	In. 9.05	21	In. 3.94	23.72	Nambour ...	In. 8.34	26	In. 5.91	21.26
Cairns ...	15.01	40	11.22	22.03	Nanango ...	4.26	40	1.93	2.66
Cardwell ...	16.60	50	5.32	41.29	Rockhampton ...	7.40	35	0.42	11.73
Cooktown ...	13.42	46	8.82	7.52	Woodford ...	8.67	35	2.88	11.51
Herberton ...	7.23	35	3.60	16.34					
Ingham ...	15.26	30	4.32	35.78					
Innisfail ...	21.51	41	14.51	44.09					
Mossman ...	15.01	14	8.78	23.54					
Townsville ...	11.61	51	0.27	13.31					
<i>Central Coast.</i>					<i>Darling Downs.</i>				
Ayr ...	8.82	35	0.12	9.18	Dalby ...	2.87	52	0.32	2.28
Bowen ...	8.55	51	0.93	12.94	Emu Vale ...	2.26	26	0.00	1.33
Charters Towers ...	4.37	40	0.37	5.24	Jimbour ...	2.83	34	0.03	2.23
Mackay ...	11.54	51	1.38	11.11	Miles ...	2.64	37	0.07	2.53
Proserpine ...	10.58	19	1.56	19.53	Stanthorpe ...	3.31	49	0.20	1.41
St. Lawrence ...	7.93	51	2.29	12.50	Toowoomba ...	4.31	50	0.07	4.63
					Warwick ...	3.12	57	1.10	1.77
<i>South Coast.</i>					<i>Maranoa.</i>				
Biggenden ...	3.59	23	0.41	2.90	Roma ...	3.07	48	1.35	1.68
Bundaberg ...	6.04	39	0.48	9.60					
Brisbane ...	6.27	72	0.69	7.55					
Childers ...	5.77	27	0.61	8.17					
Crohamhurst ...	13.85	30	3.47	19.68					
Esk ...	5.37	35	0.15	6.19					
Gayndah ...	4.09	51	0.12	1.85					
Gympie ...	6.50	52	1.48	12.00					
Glasshouse Mts. ...	7.96	14	4.32	16.69					
Kilkivan ...	4.94	43	1.45	4.92					
Maryborough ...	6.40	51	5.18	7.25					
					<i>State Farms, &c.</i>				
					Bungeworgorai ...	2.69	8	1.21	0.64
					Gatton College ...	2.84	23	...	3.13
					Gindie ...	2.68	23	...	8.96
					Hermitage ...	2.35	16	...	1.71
					Kairi ...	6.70	8	...	26.49
					Sugar Experiment Station, Mackay	10.23	25	2.09	10.78
					Warren ...	3.93	8	...	7.32

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for February, 1923, and for the same period of 1922, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
State Meteorologist.

BOT FLY.

To prevent the flies from finding a suitable lodgment for their eggs, the long hairs should be clipped off or singed from the nose, lips, jaws, shoulders, and legs of all horses. Regular daily grooming should be carried out to detach any fly eggs, before they have time to hatch, and the parts from which the long hairs have been removed should be smeared daily with a mixture of linseed oil 20 parts, turpentine or kerosene 1 part. All manure containing bots or grubs should be destroyed by burning.

After a horse is affected—viz., when the bot fly grubs are in the stomach—medicines are of little service in removing them until the summer months, when they are being naturally expelled. It is then advisable to drench with one of the following drenches:—

(1) Turpentine, 2 oz., mixed in 1 pint of milk; or

(2) Carbolic acid 2 drachms, glycerine 2 oz., water 4 oz., milk 1 pint.

Either of these drenches should be followed in a few hours by giving 5 drachms of aloes, as a ball, or 1 pint of raw linseed oil.—Major Cory, M.R.C.V.S.

WEEDS OF QUEENSLAND.

By C. T. WHITE, Government Botanist.

No. 31.

THE RUBBER VINE (*Cryptostegia grandiflora*).

The Rubber Vine (*Cryptostegia grandiflora*) has for some years past been a naturalised weed in parts of Northern and Central Queensland. Of late years it has become a considerable pest along some of the Gulf rivers, and at the urgent request of the Etheridge Shire Council the plant has been declared a noxious weed throughout the State. There is, practically speaking, little or no possibility, however, of the plant becoming a pest in the southern parts of Queensland.

Description.—A rampant climber, often of shrubby growth when growing in the open, the stem, leaves, and seed vessels exuding a milky sap when cut or broken. Leaves glabrous, elliptic, $2\frac{1}{2}$ —4 in. long, $1\frac{1}{2}$ —2 in. wide. Flowers large, borne in terminal cymes; corolla from almost white to lilac purple about 2 in. across. Seed vessels (follicles) 4—6 in. long; seeds very numerous, each with a tuft of long, white, silky hairs at the apex.

Distribution.—Native country probably Madagascar; common cultivated or naturalised in most tropical countries.

Botanical Name.—*Cryptostegia*, from the Greek *kryptos*, hidden, and *stega*, a covering from the essential parts of the flower being concealed in the throat and not exposed as in neighbouring genera.

Properties.—The plant yields rubber of commercial quality. Samples of the rubber collected from plants growing at Charters Towers and submitted to the Dunlop Rubber Company by this Department in 1910 were reported on as being worth 3s. to 3s. 2d. per lb. (then rather a low figure). The following interesting report on this rubber was made at the same time by Mr. Howard Newport, Instructor in Tropical Agriculture, at Cairns:—

“*Cryptostegia grandiflora* has been recorded for many years as producing rubber of fair quality in India, Madagascar, and elsewhere. The rubber is commercially known as ‘Palay.’ The plant has been experimented with, I believe, in the Calcutta, Peradeniya, and other agricultural and botanical institutions, but has not been received by planters with favour.

“Palay rubber belongs to a group of rubbers collected from the stems of vines or creepers, generally by a process of cutting up the whole of the aboveground growth (and sometimes the root also) for subsequent extraction of the latex by natural exudation from the cut surface, by crushing or grinding, or by boiling, &c. In either case the vine is destroyed and has frequently to be left for considerable periods (sometimes ten years) before sufficient new growth has taken place to make another collection worth while. Hence vine rubbers, though of good quality and valuable where found growing wild in scrub or forest areas, have not met with a favourable reception as plants for cultivation in plantations, comparing unfavourably with trees such as Para, Ceara, Castilloa, Assam, &c., which can be tapped continuously for many years.

“It may be noted that the price quoted for the samples obtained from Charters Towers—viz., 3s. to 3s. 2d.—scarcely indicates a high quality in view of the fact that fine hard para rubber at the time was 9s. 6d. per lb., and the very worst and dirtiest ‘negro head’ wild rubber 2s. 6d. to 2s. 9d. per lb., and hence it is doubtful whether it would pay to collect this with white (even child) labour at the price, but considerable improvement may be possible.”

Poisonous properties.—The “Rubber Vine” belongs to a family—the *Asclepiadaceæ*—containing a number of plants possessing poisonous properties. I have heard of no cases of stock poisoning from the plant, but animals rarely if ever touch it.

Eradication.—Where possible the plants should be grubbed out and burnt. Where growing very thickly spraying with an arsenical weed-killer might prove effective. The Agricultural Chemist has recommended the following as a suitable spray for weeds. “Half a pound of arsenic, dissolved by means of $\frac{1}{4}$ lb. of caustic soda, in 3 gallons of water; and this solution then diluted to 10 gallons with water.”

Botanical Reference.—*Cryptostegia grandiflora* R. Brown, in *Botanical Register* t. 435 (1819).



PLATE 57.—RUBBER VINE (*Cryptostegia grandiflora*).

A.—Flowering shoot.

B.—Seed pod (follicle).

C.—Seed.

SOME NOTES ON SILAGE WITH SPECIAL REFERENCE TO STACKS.

By H. C. QUODLING, Director of Agriculture.

Silage stacks suffer deterioration if an attempt is made to hold them over from season to season. Best results are obtained by building them at the latter end of Summer, in the flush season, and using the fodder in the Winter or Early Spring.

It is evident that the dairymen and sheep farmers of our agricultural districts will never come into their own until their stock can be satisfactorily carried through the winters and over any dry spells which may occur.

Increased land values, and a general all-round rise in the cost of living and, similarly, in that of production, may be cited as reasons for keeping stock in condition and in a state of efficient productivity consistent with ruling conditions.

Cultivated crops and artificial pastures are doing much in effect, but seasonable shortcomings can only be met by looking to the contents of the barn for dry feed, and to the silo or stack; in this latter instance is to be found a palatable, ready-to-hand form of succulent fodder, which should be provided on every farm where live stock are kept for profit. Many arguments may be advanced in favour of silage, but it is felt these are not required where practical thinking men are concerned, whose chief inquiry is for reasons to prove to their intelligence that, by adopting certain methods of conserving fodder, they are to get a *quid pro quo* for their outlay, be it in labour or in kind.

Queensland's rich soils and generous summer rainfall are responsible for crop growths not attainable in the more temperate parts of the Commonwealth; and when such tangible results are to be so easily secured from Nature's garden, it is certain that a stockowner's desiderata in the matter of a supply of the right class of fodder will be readily attained by an extension of the self-help methods common to all who have to wrest a living from the land.

Inquiries through the medium of the Department on silo construction and its attendant features are sufficiently numerous to indicate that interest has been aroused in the subject of fodder conservation.

It is not proposed here to dilate on the merits of different silos or advocate possibly out-of-reach methods likely to act as a deterrent on account of an initial outlay of capital but rather to deal only with a section of the subject with simple and economic features designed to meet local and existing conditions.



Plate 58.—Sledge cutter at work in an immature crop, showing manner in which stalks are laid down by means of guide rod.

A number of silage demonstrations have been carried out by Departmental officers, and, although evidence in a general sense is not wanting to show the possibilities of fodder conservation, it is more fitting that the words of those farmers who have followed out the methods advocated may be made known to others who contemplate erecting silos or stacks.

Extracts from their manuscripts are as follows:—

“The stacking of maize was finished on Saturday, 3rd May. All are well pleased with the way the lever worked. It was rigged up so that the bundles were slung right over the side into the middle of the stack, and the earth for weighting (6 tons) was put up in the same way. We started feeding the silage to the cows straight away, and they took to it greedily, and are showing an increase already, so we are reaping the benefit of stored fodder.”

“The ensilage is very good, and the cows would tear the stack of maize down to get at it.”

“I think the method of stacking all that can be desired—that is, when one cannot afford to build a silo. It opens up splendidly, in my opinion, with very little waste, and stock eat it readily, notwithstanding that we had to cut the crop (maize and sorghum) on the green side, on account of being afraid of frost. The cows chase the dray as soon as they see it, and milk well on the fodder.”

“It has been the means of storing from 100 to 160 tons of silage (sorghum and maize) which might otherwise have been spoilt.”

“In 7 weeks after stacking, I commenced to use the silage, and came to the conclusion, in a very short time, that I had a valuable asset from a feeding point of view. I fed in boxes at the rate of 40 lb. per diem per cow, and cows which had been in milk from 4 to 8 months increased their flow fully 50 per cent. Cows which have newly freshened keep up their normal first flow unceasingly, and that during winter. It is better to feed after milking than before, and I am at present obtaining an A1 grade from the factory for my cream. . . . am well satisfied with the experiment, and have come down to the bed-rock conclusion that, as soon as funds will permit, I will erect a silo, as, after some years' experience, it has been found that one cannot 'dairy' in the winter on artificial grasses with profit, and ensilage appears to be a *par excellence* winter ration. The sorghum ensilage is chaffed with a small percentage of sugar-cane, in order to carry it through the chaffcutter, as it is not the best stuff to chaff by itself.”

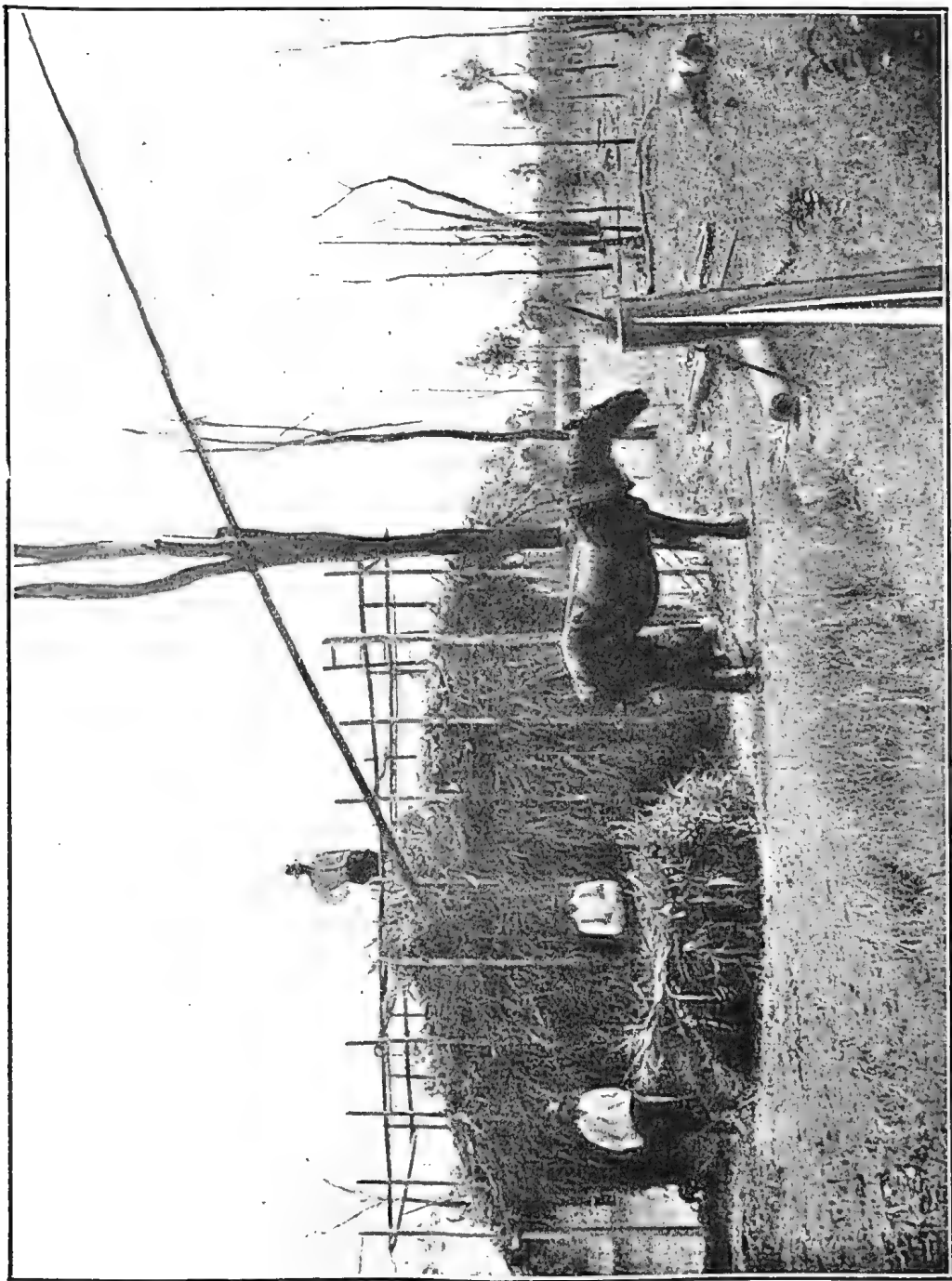


Plate 59.—Stack in course of construction, showing projecting “untrinned” ends, also “whip” hoist attached by means of a chain to a dead tree

"Maize and sorghum were sown in alternate rows. Owing to dry weather, there was only a light crop; a reaper and binder was used to cut the crop, and the carting was done with rough sledges, each drawn by one horse; stacking began on 26th March, and the stack was opened in the second week in July. After cutting down the first bench of about 9 in. as waste, it was found to be in good condition. The cows did not take to it at first, but the calves ate it well. One by one, however, the cows began to eat it, and now nearly all of them are feeding on it, some of them taking it greedily."

"We are milking 22 cows, and it is a significant fact that a pronounced increase in the milk yield has followed. As they have no other change of food, I can only attribute this increase to the silage. As the feed* in our paddocks is now becoming poor, and there is little prospect of its improving for a month or so, I view the silo, with its stock of compressed fodder, with great satisfaction, as I believe it will tide our dairy herd over the critical period of the year. This is its great value, and I more than ever see the wisdom of having laid by this winter store of food. During the coming summer I shall build a much larger stack on the same pattern, and hope to put by 70 or 80 tons of maize and sorghum for the winter. I assure you of my complete satisfaction at the result of your experiment on my farm."

"Am very well satisfied with the experiment and will build a considerably larger stack next year, all being well. I am not using up to the full amount, but what I am is keeping my cream and milk supply up to its regular amount; other hay, such as lucerne, oaten, and, at times, bush hay is mixed with it. My cows, when it was first offered to them, did not seem to care about eating it, but now they have got used to it, they nearly go mad to get at their feed."

"I opened one end of the stack to see what it was like, and am glad to say it is first class. I am perfectly satisfied with the experiment, and intend going in more for it in the future. When stacking was finished I put in 18 inches of earth on top, sloping from centre of stack to the ends; then five wires across the top and hung very heavy logs to them; two persons who have examined the stack, and know stack ensilage in other parts, state that it is in excellent condition."

Instances are not uncommon where maize crops have made good growth up to a certain stage and then failed to set grain through the

* Principally Rhodes grass.

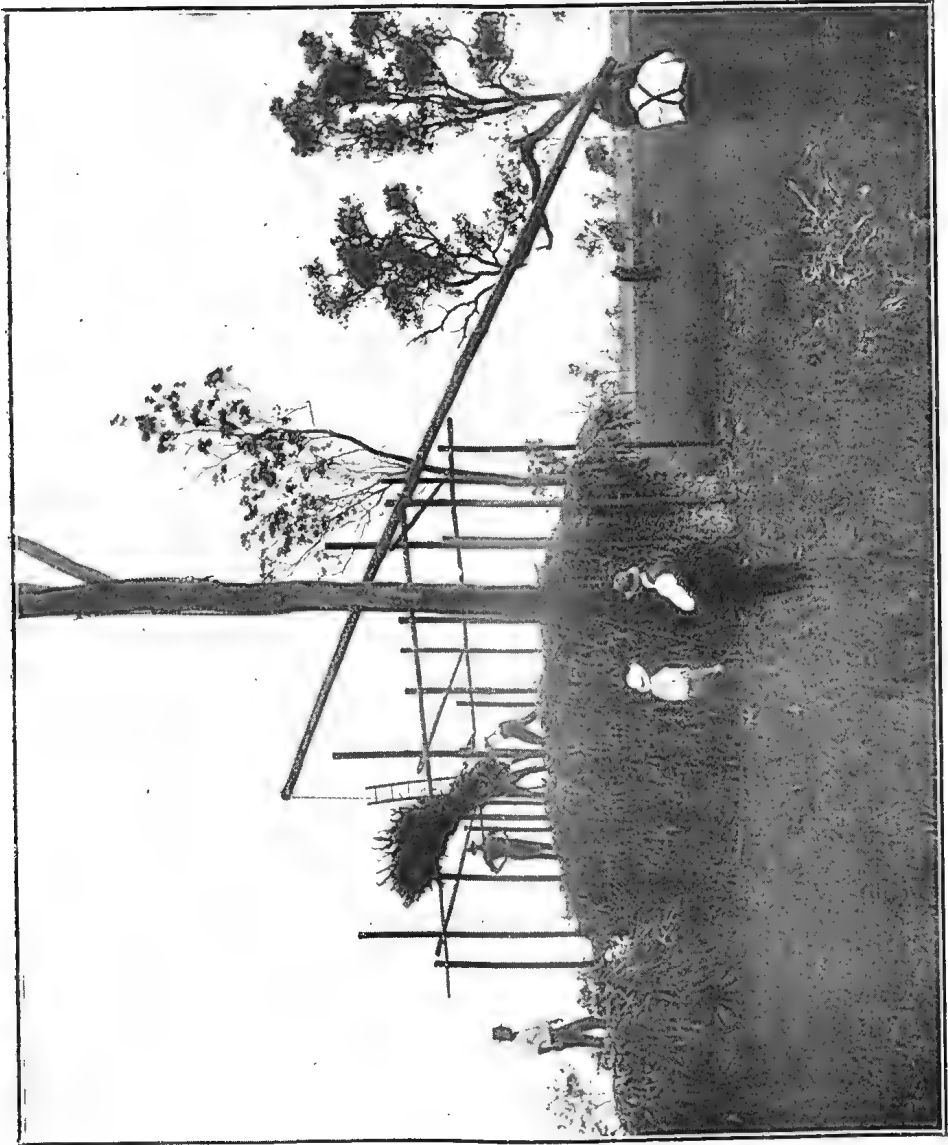


PLATE 60.—Stack silage demonstration at dairy inspectors' special silage instructional course,
Queensland Agricultural College, Gatton, 1919.

dry weather. In the Southern Burnett part of the 1916 crop was affected in this way. Altogether about 50 stacks were erected in this locality alone, some ranging to 150 tons capacity.

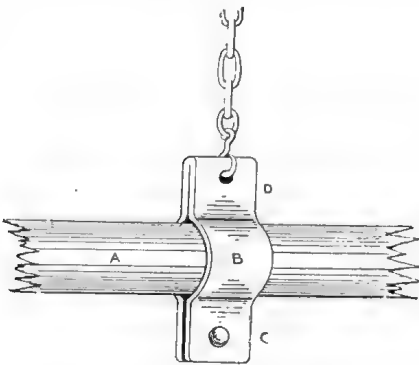
Again in 1919 officers of this Department held demonstrations in silage making, and travelled through several districts with the object of assisting and advising farmers who were determined to turn their wilted crops to good account for fodder purposes, upwards of 12,000 tons of fodder being conserved, which assisted in saving the lives of many valuable dairy stock.

Inquiries made since show that the silage was found to be of great value and of satisfactory quality.

POINTS TO BE OBSERVED.

Maize is one of the best and most satisfactory crops to grow, but any ordinary crop which is commonly used for green fodder or hay will make good silage.

The amount of labour involved in the handling of bulky green fodders may be considerably reduced when machinery is available for cutting and for binding into sheaves.



CLAMP FOR SUSPENDING WHIP.

- (a) Whip spar.
- (b) Clamp made from an old tyre 4" \times $\frac{5}{8}$ ".
- (c) Clamping bolt.
- (d) Clamp welded and bored for hook.

Where large quantities of fodder are to be handled, a mechanical hoist is required for the higher levels of the stack. For hand work the "whip" type is preferable. In connection with the erection of a "whip" it is necessary that some means be adopted to prevent the spar slipping at the point of suspension, and the clamp shown in the sketch is an effective and useful means of preventing this. A substitute which is also very effective may be obtained by using an ordinary chain strong enough for the purpose and forming a "clove" hitch at the point of suspension, afterwards nailing on two small

hardwood blocks to the "whip" spar, one above and one below the position of the chain on the spar; or drive in two strong iron staples. For horse power a yardarm and spar, with suitable blocks and the necessary wire rope and clutching dogs, make an effective combination, or pulleys and tackling may be substituted.

Fodder stacked in the open is subjected to an atmospheric pressure of 15 lb. to the square inch; and the stacker's chief concern should be to check combustion as much as possible—i.e., by preventing the access of air to the mass.

Waste is unavoidable at ends and sides and is to be expected. A 25 per cent. depreciation will take place under indifferent conditions of stacking. The loss under good conditions should not be more than 12 per cent., provided attention is given to salient features and to working detail.

Coarse or fairly mature fodders require a greater dead weight pressure, and do not compact as readily as finer and more succulent plants.

Emphasis is placed on the fact that the success of a silage stack depends very largely on the consolidation of the contained fodder so as to exclude air, which, if admitted, would cause rapid deterioration.

“Use plenty of weight when stack is completed.”

Variations in temperature are factors in the chemical and biological changes which take place in the process of turning a mass of green fodder into silage, but it is unnecessary to go to any more trouble than to check the processes of oxidation and fermentation which are responsible for high and abnormal temperatures. When undue heating takes place during the process of stacking, the temperature of the mass is readily reduced by putting on more green fodder, and by throwing a series of wires across the stack and hanging heavy logs to them; this may be done at the close of each day's operations. Where a limited number of animals are kept, long and narrow stacks are preferable, as the lesser superficial surface is exposed at the ends when feeding out. The higher the stack, in keeping with facilities for hoisting, the better.

It takes from 50 to 56 cubic feet of consolidated silage to make a ton. Crop yields may be computed and the dimensions of frame work arrived at. Abnormal settlement is to be expected, and weighted stacks usually settle down finally to a little less than two-thirds of their original height.

Heavy crops like maize and sorghums should be evenly sown in regularly spaced drills to facilitate harvesting by machines; the production of a medium thickness of stalk with a maximum of leaf should be aimed at.

Immature crops produce a less palatable and inferior article from a feeding standpoint. Where maize is to be chaffed into a silo, the crop may be left standing until the plants acquire the most nutriment—i.e., when the grain attains the soft dough stage.

For stacking, it is an advantage to cut when the grain is in the “milk” stage before the stalks become too firm. Sorghum, Japanese millet, panicum, &c., should be cut when the seed heads or panicles are well formed and the grain about half developed.

The Stack.—The site should be chosen on a naturally drained piece of ground, and handy for feeding out to the stock, and yet as close to the crop as it is possible to get it.

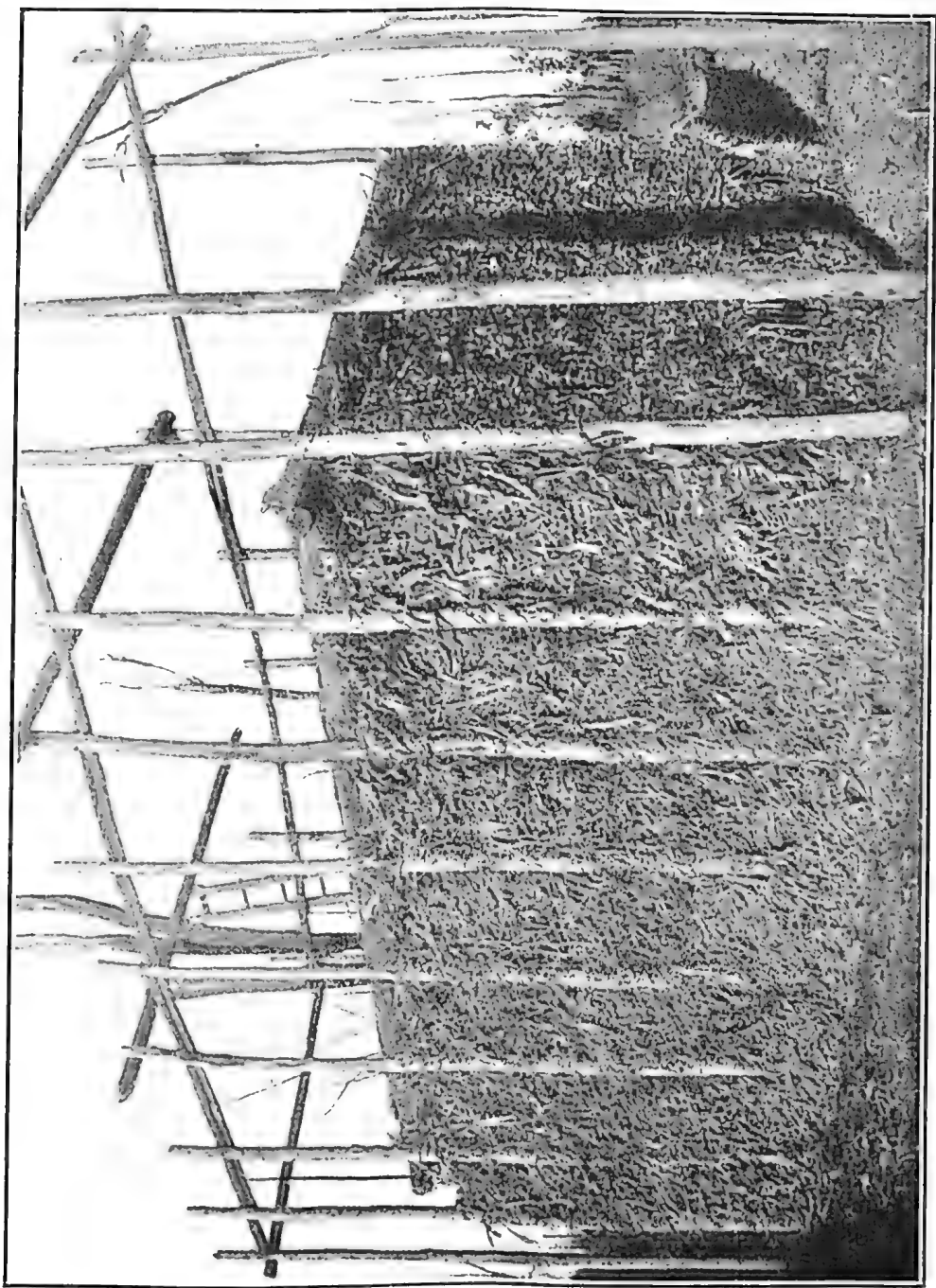


Plate 61.—Framework and “trimmed” stack, showing an extra pair of uprights at each end, to which a crosspiece is attached for supporting the ends of the fodder when stacking.

When computing prospective contents of stacks several factors require to be taken into consideration, amongst which are—

Material used for silage;

Condition of crop at time of cutting;

And the amount of dead weight to be subsequently added to consolidate the stack.

Sorghums and millets are inclined to pack tightly and afford, on this account, a heavier average weight to the cubic foot than maize.

The following table of contents of various sized stacks may be taken as approximate; sorghums and millets, as previously mentioned, will weigh somewhat heavier:—

SIZE OF PERMANENT STACK AFTER ENDS ARE TRIMMED.

Feet.		Tons.
12 × 9 × 15	=	42.6
12 × 10 × 15	=	47.3
15 × 9 × 15	=	53.3
15 × 11 × 15	=	65.1
18 × 10 × 15	=	71.0
18 × 12 × 15	=	85.2
21 × 12 × 15	=	99.4
21 × 14 × 15	=	116.0

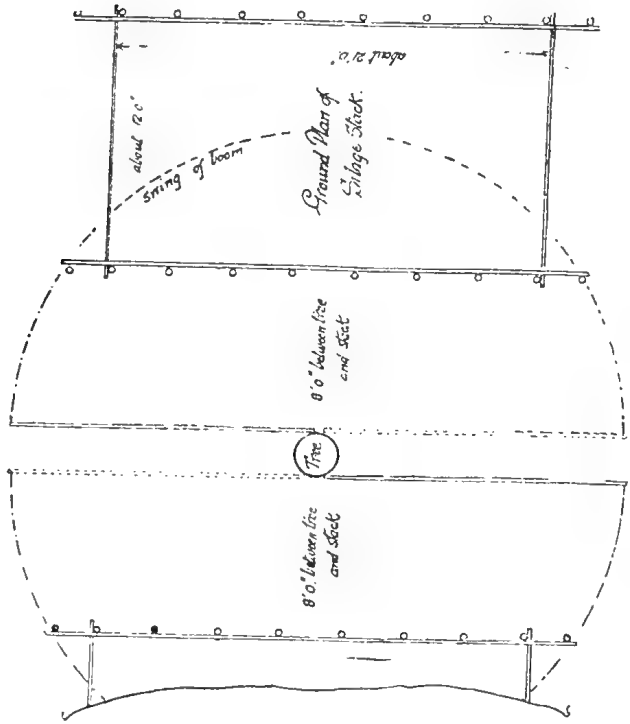
In setting out a frame for a stack 18 ft. by 10 ft., ten poles on each side would be required, arranged as follows:—

Poles require to be 17 ft. 6 in. in length, and about 5 or 6 in. in diameter at butts. Sink the holes 20 to 24 in. in the ground. Top plates and tie beams should be securely twitched on close to the top of uprights, to make the framework rigid.

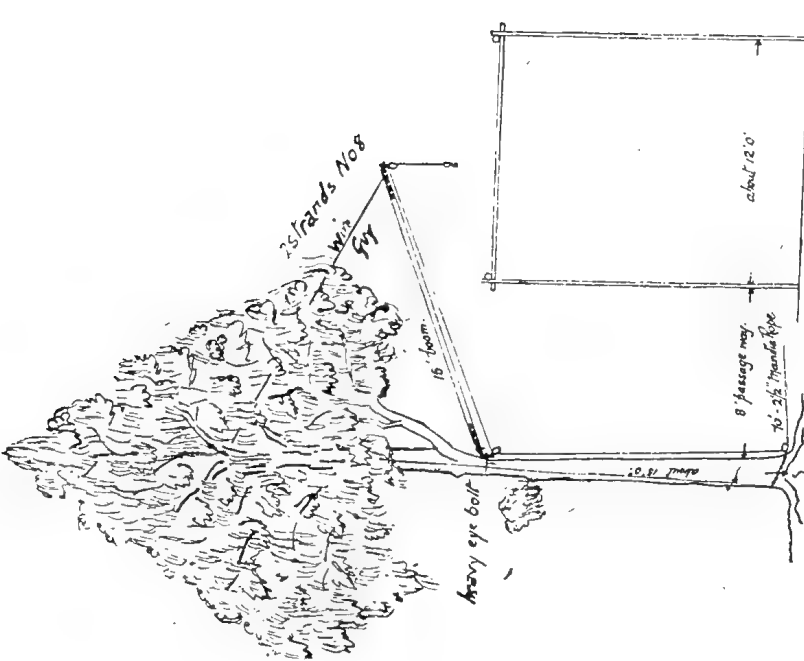
When long-stalked crops are to be stacked, a fair average distance apart to place the uprights is 3 ft.; for shorter-growing crops this distance should be lessened accordingly.

Construct a framework of bush poles similar in design to those in accompanying illustrations, the dimensions of which and distances between the uprights being arranged so as to accommodate the amount and class of fodder on hand. Plant the poles firmly in the ground; attach the top plates with a wire twitch at a height of, say, 15 ft. from the ground. Brace across at ends and at centre, taking care that the pair of poles intended for carrying the central brace or tie are carried up high enough to give head room for the stacker when moving about on the upper levels of the stack.

Single horse chest for stacking fodder:



Ground plan



Elevation

The uprights may be spaced at a distance apart of 3 ft. along the sides for maize and sorghums, and a minimum of 2 ft. for crops like barley and panicum. An extra pair of uprights should be put in at each end of the framework and braced securely; a crosspiece is attached to these to carry the projecting ends of the fodder until such time as they are trimmed off, the crosspiece subsequently being moved higher up to serve a similar purpose.

The position of that portion of the top plate, proving to be in the way for the "travel" of the whip, may require to be altered temporarily, or brought down to a lower level, and afterwards raised as stacking progresses.

The framework is of no value once the stack has settled down.

The "corn binder" is the most approved machine for cutting and binding maize and similar strong-growing crops into sheaves.



Plate 62.—Sledge cutter 5 feet 6 inches long by 2 feet 4 inches wide, showing projecting scythe blade (passed through mortice), also angle to set guide rod.

Lighter classes of crops may be handled to advantage with an ordinary "reaper and binder" or back-delivery "reaper."

The secret of handling heavy crops is to keep the stalks parallel in the bundles, whether cut by machine or by hand.

Maize and sorghums, if standing fairly upright in the drills, may be cut with a sledge cutter, which is simply a narrow sledge, set on a pair of runners and decked with 6 in. by 1 in. boards—a scythe blade

is attached at one side at an angle adapted for slicing off the stalks, and should be braced in such a way as not to interfere with the cutting. Fix a guide rod to lay the plants down evenly in a regular swarth. They can then be kept fairly parallel when gathering them into bundles. For hand work an ordinary cane knife is very suitable.

Sledges are the handiest for short hauling distances; when the "hoist" is used, the fodder should be loaded on to suitably sized rope slings to be ready for lifting off.

Before commencing to stack, open out a shallow drain around the outside of framework, and use the soil for levelling off any surface inequalities within it. Place a layer of about 6 in. of waste green grass on the ground. Start stacking on this and **KEEP ALL THE STALKS LAID THE ONE WAY.** Transverse layers admit air far too much into the stack. Place the tassel end of the maize at least 3 ft. 6 in. over at both ends of the stack. When placing down the next layer, reverse the order, and if the fodder is at all on the dry side, damp it with water, and take the precaution also of placing some of the leafy portions of the fodder over any bare patches which may be present. When a height of about 3 ft. has been reached, lay down a board flush with a pair of uprights which are to form the true ends of the stack, and trim off the projecting ends of the fodder. Before starting to stack again, move the crosspieces up the outside pair of uprights, in order to support the ends of the second tier of fodder. Repeat the process of stacking and trimming off as previously noted.

A minimum thickness of not less than 2 ft. 6 in. of fodder should be stacked each day.

Keep a good camber in the centre of the stack, as heating soon causes abnormal settling there. Use judgment when binding the layers back, so as not to have any bumpy joints where the laps come. Care should be exercised in placing fairly straight stalks along the sides, and these should be well firmed down between each pair of poles, the laps being carefully watched to prevent any spaces being left.

The trimming of the ends, which should be done with a plain hay-knife, ensures a consolidated section exposed to atmospheric influences, but the carefully concealed over-lapping of the stalks at the sides is essential for keeping the air from penetrating the mass; the more the air is kept out, the smaller the percentage of loss.

Settling takes place rapidly as soon as the mass begins to heat.

As previously noted, wires, heavily weighted, should be thrown over the stack at night time, attention being paid to the placing of separate wires within a few inches of each end of the stack where it is trimmed off. Remove wires and weights before continuing to stack next morning. Allow a big margin for settling. When finished to a full camber, spread



PLATE 63.—Stack built on Mr. T. Chay's farm at Wetheron under the supervision of the Department of Agriculture and Stock.

a layer of several inches of soft green grass or other close-textured weeds immediately on top of the silage; water this well. A framework of logs should then be placed evenly on top of the completed stack; these should be halved at the ends in a similar manner to the ground plates of an ordinary building. The weighting material is evenly disposed over the whole surface of the stack, the logs keeping the loose soil, or any other kind of material used to supply the weight, in its place. The layer of soil must average about 12 in. in thickness. The stack should then be topped off with bush hay or other waterproof material. A neat finish should be given to the roof, which requires to be built to a full eave, and all loose straws raked off. Wires are then placed across the top, and well weighted in order to keep them in position.

OTHER WEIGHTING MATERIAL.

Stones, where they are easily procurable, may be substituted for soil, and the spaces between the stones can then be filled, if so desired, by soil.

Permanent weighting material is readily prepared by filling kerosene or benzine tins with concrete or with cement and sand compo., twisted wire handles being inserted in the mixture before setting takes place. This latter system economises labour where silage-making becomes a regular institution on the farm.

Although it is an advantage to allow the stack several weeks in which to settle down, and afford the necessary time which is required to effect the metamorphosis "from green fodder to silage," it may be opened at once, should the fodder be then required. All that is necessary is to throw off some soil at the extreme end of the stack and cut down a narrow bench from top to bottom. The covering of soil on top keeps the rest safe from the weather.

Stacks are not meant to last more than a few months on account of depreciation from exposure to the weather, but instances have occurred where they have been kept for years, and then used to advantage. (Silage will keep, however, for many years in a well-built silo, and the depreciation is infinitesimal.)

Better results are obtained by chaffing the silage before use, and its passage through the chaffcutter is facilitated by using any strong-stalked fodder to assist in carrying it through.

A handy method to provide for feeding out to animals is to make receptacles, to act as makeshift troughing, out of ordinary 4-bushel sacks strung on No. 8 wires. Pairs of round uprights are put in at opposite ends of a line of fencing, the character, length, and gauge of which are designed to carry the sacks strung out on or sewn at each side to No. 8 fencing wires, running parallel to one another and placed at

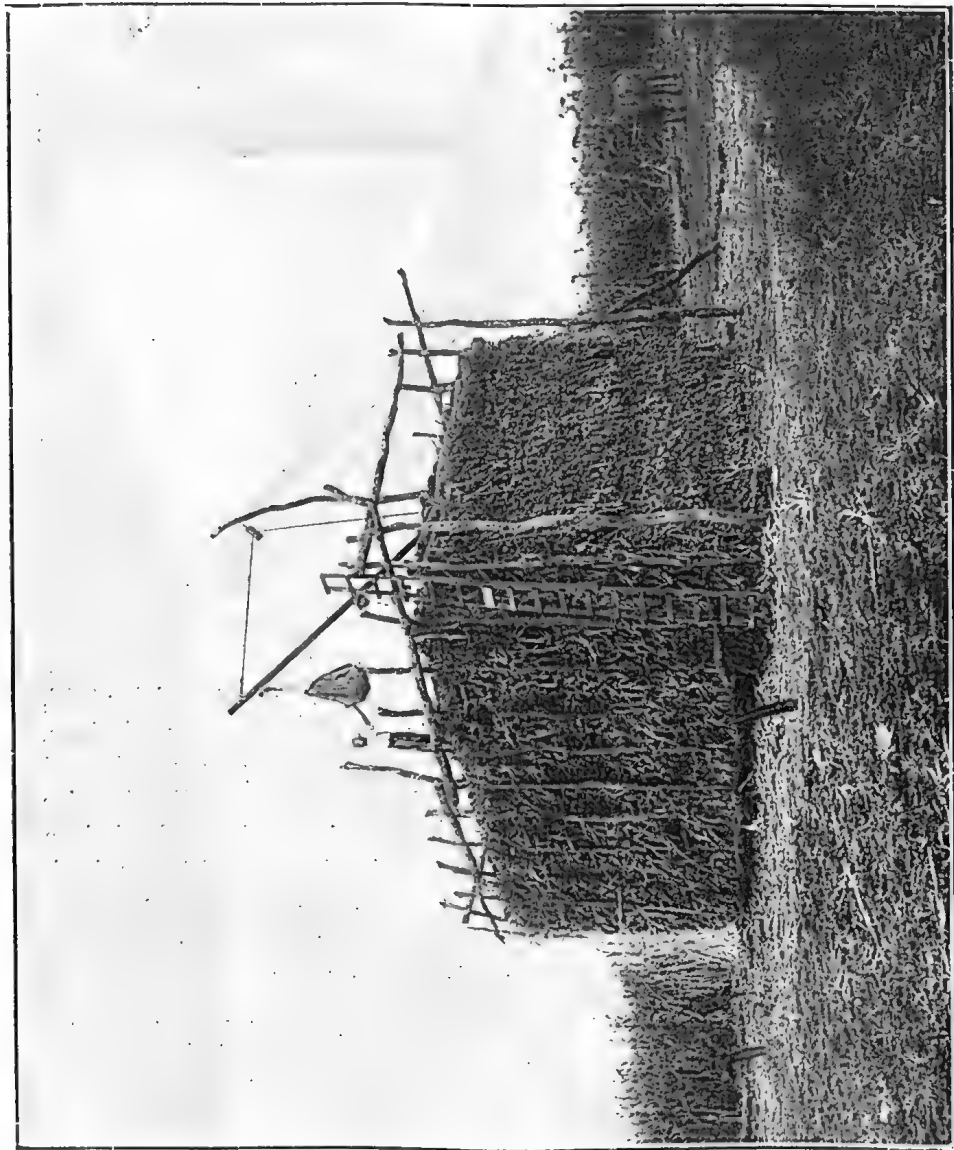


Plate 64.—Stack in course of construction at Bowenville, Darling Downs. Weighting material (stones) being hoisted by a horse prior to the topping off of stack with bush hay.

such a width apart as to form the suspended sacks into receptacle of the desired depth. Crosspieces may be nailed to a series of pairs of intermediate posts, and the holes for the wires bored through these to suit. The same class of feeding receptacles may be used for sheep, but should be made narrower and kept at a convenient height from the ground for feeding.

BRIEF NOTES ON SILAGE AS FOOD.

“Silage is not a perfect food, and must be supplemented by other fodders and concentrates where full milk production is looked for.”

Plants like maize, sorghum, and similar fodders, which contain a relatively high proportion of carbohydrates (starch, sugars, &c.) used in an animal's system for maintaining bodily heat, do not form perfect foods until more protein or flesh-forming substances are added in proportion, recognised as suitable in the aggregate, for making up a balanced ration. Leguminous plants—lucerne, cowpeas, field peas, &c.—are designed by Nature to supply this deficiency. In practice, it is found that the succulence of silage assists in the assimilation by animals of dry foods and cured fodders.

A good combination of food for one day, sufficient for the support of one cow of 1,000 lb. weight, when yielding up to 3 gallons of milk, is arrived at by feeding 45 lb. of maize silage and 15 lb. of lucerne as hay or chaff; another ration, equally suitable, but not quite so rich, may be made up by using 40 lb. of the former and 20 lb. of cowpea chaff. The nutritive ratios of the fodders noted work out at 1 : 4.73 and 1 : 6.16, respectively. Analyses of fodders and silage present many variations. A general average per head per day for the support of a number of milch cows, when other feed is scarce, may be set down at 40 lb. of maize silage and 15 lb. of lucerne chaff. With this as a basis, the feeder is in a position to use his intuition and judgment in dealing with the individuality of animals.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 19.

THE SCRUB BEEFWOOD.

The Scrub Beefwood (*Stenocarpus salignus*) is not a very well-known tree in Queensland, except in the extreme south-eastern portion of the State. The trees attain a height of about 80 feet with a barrel diameter of about 2 feet. The barrel is sometimes flanged at the base. The bark is brown, often finely wrinkled or striated; and when cut is seen to be brownish pink in colour. The species is found in the rain forests (“scrubs”) of Eastern Australia from Illawarra, New South Wales, to the south-eastern part of Queensland, in and around the Macpherson Range. The timber is of the silky oak type, and is used for purposes in which silky oak is employed.



Photo. by the Authors.]

PLATE 65.—SCRUB BEEFWOOD (*Stenocarpus salignus*).
A tree in the rain-forest of Roberts Plateau, National Park.

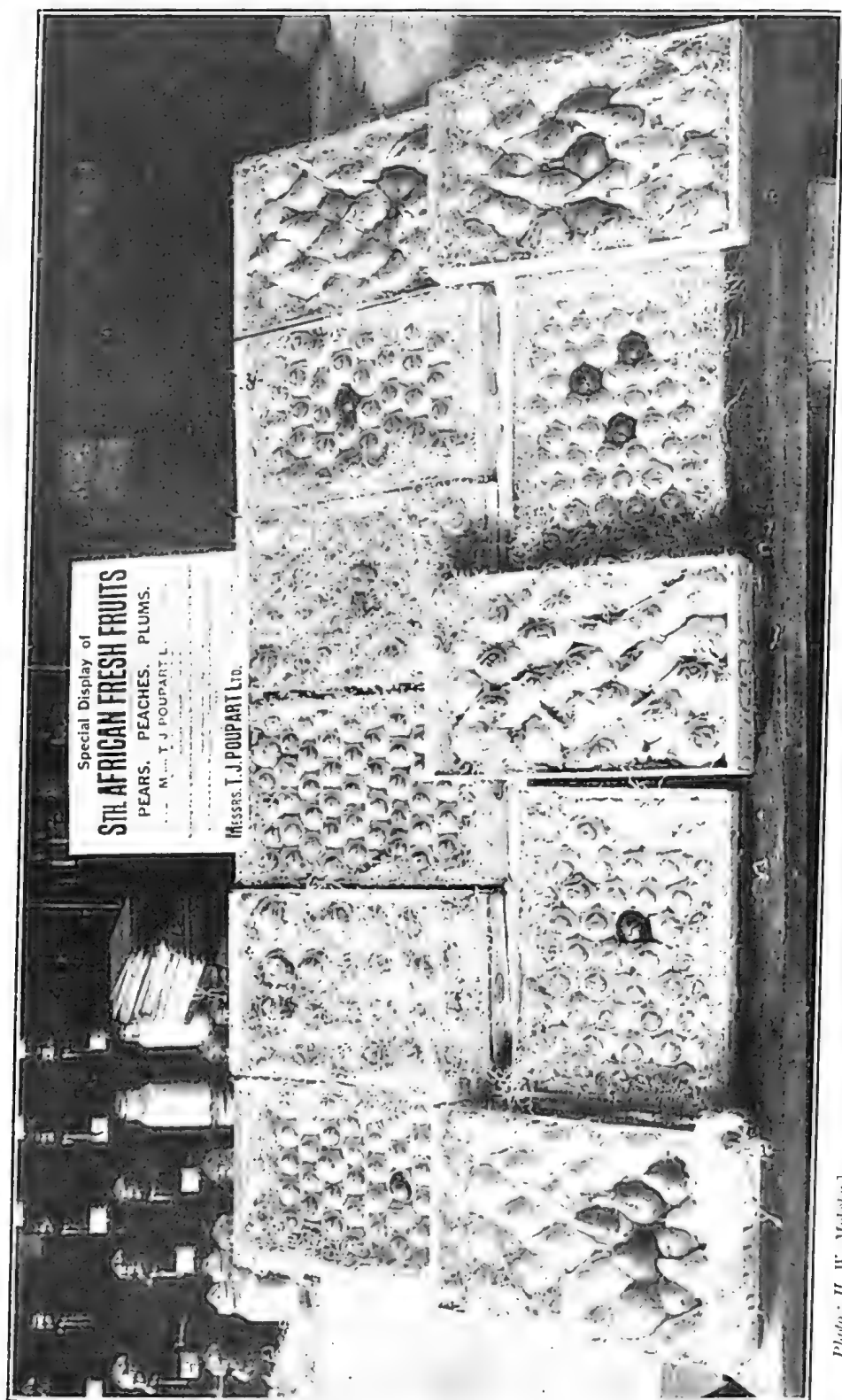


Photo: H. W. Molesley.

PLATE 66.—A SAMPLE PACK OF AFRICAN FRUITS FOR ENGLISH MARKETS. EXHIBITED A.N.A. EXHIBITION, MELBOURNE.



Photo: H. W. Molsby.]
 PLATE 67.—THE QUEENSLAND EXHIBIT, AUSTRALIAN NATIVES' ASSOCIATION EXHIBITION, MELBOURNE, 1923.

STUD STOCK STUDIES.

BEST BREEDS OF PIGS FOR QUEENSLAND CONDITIONS.*

BERKSHIRE.

This is the most popular breed in Queensland, and is acclimatised. It readily suits itself to the surroundings under which it is kept.

Characteristics of the breed may be described as follows:—

The Berkshire is symmetrical in outline, a good grazer, fattens rapidly, and when kept growing from birth should be fit for the bacon curer at from five to six months, and weigh when dressed from 100 to 120 lb., thereby furnishing a range of weight favoured by bacon manufacturers.

Colour, black, with a plentiful supply of fine-textured hair; white blaze on face; white feet; and white tip to a curly tail. Above medium size; head broad with decidedly dished face; ears thin, velvety in texture, erect, rather inclined forward; jowl full and carrying well back. Chest, wide and deep. Back, long and straight. Ribs, well sprung. Belly, deep, with full and thick flanks, giving good underline. Hams, broad, deep and fleshy down to the hocks. The pig should be well and firmly set on his legs, which must be short, straight, and nicely set apart. Action, smart and active, with an even, regular gait. A good thrifty, all-round pig, admirably suited practically every district in the State.

The Berkshire has a robust constitution and is of a docile temperament, and rapidly responds to good food and care.

Berkshire sows make good mothers; they are fairly prolific, and litters of from eight to ten are not uncommon in well managed herds.

YORKSHIRE.

Of the three kinds originally brought to this State—viz., Large, Middle, and Small York—the Middle York alone has maintained popularity.

As a distinct white breed it has many excellent qualities, but these are discounted by the fact that unless the pigs have access to plenty of shade and grow an abundance of hair to protect them, they become scurfy in the skin on exposure or sunburn rapidly.

This drawback limits the distribution of this breed to the more temperate parts of the State.

The Mid. York is a hardy, robust, good constitutioned pig, with early maturing characteristics. It possesses a distinctive capacity to fatten evenly and rapidly, but if kept too long in the fattening pen has a tendency to lay on too thick a layer of back fat.

Other characteristics of the breed are as follows:—

Colour, distinct white with pink skin, showing a freedom from blue-coloured spots or markings.

Medium in size and of an even, symmetrical, well-rounded appearance.

Head, short, wide between the ears; face, dished.

Except for the above distinctions and a pure white, abundant coat of silky hair, the other attributes of the breed are to be considered as in the same category as the Berkshire.

*From "Pig Raising in Queensland" (E. Graham and H. C. Quodling), Dept. Agriculture and Stock, Q., Oct., 1922.

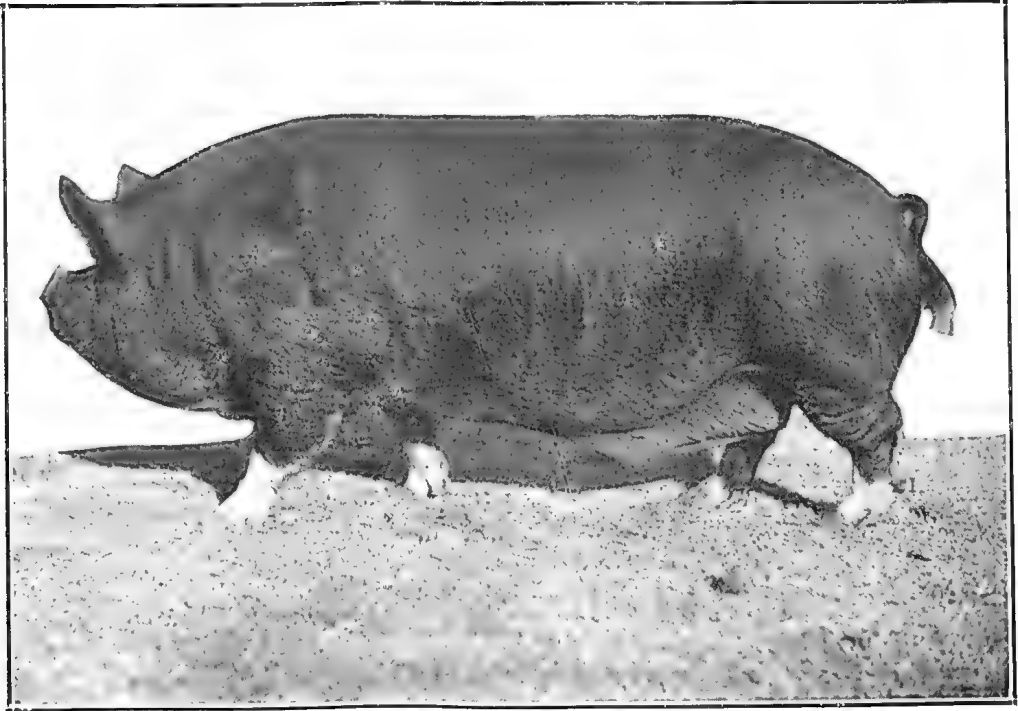


PLATE 68.—BERKSHIRE BOAR.

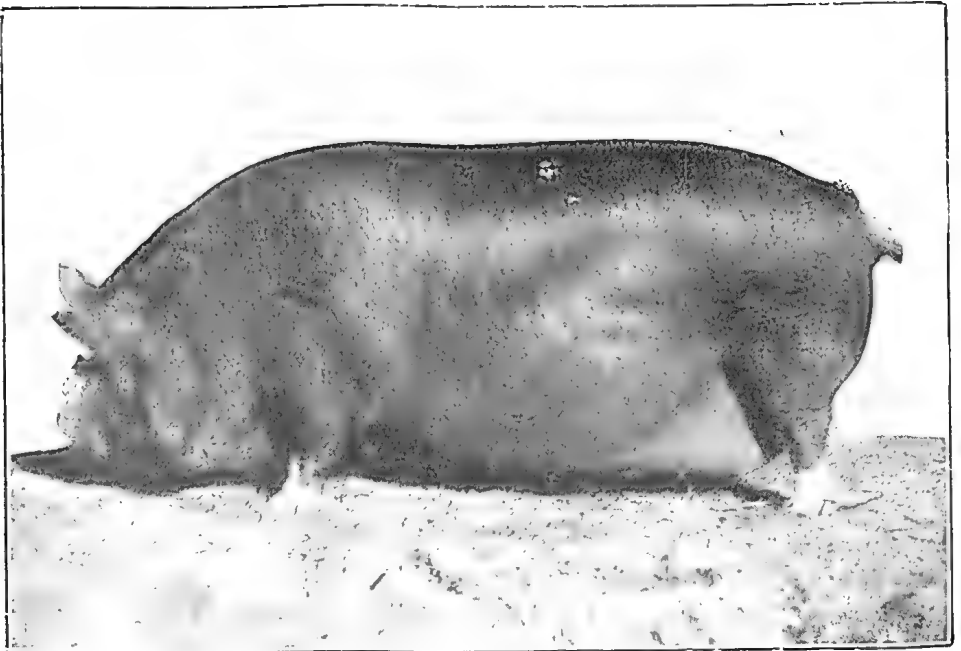


PLATE 69.—BERKSHIRE SOW.

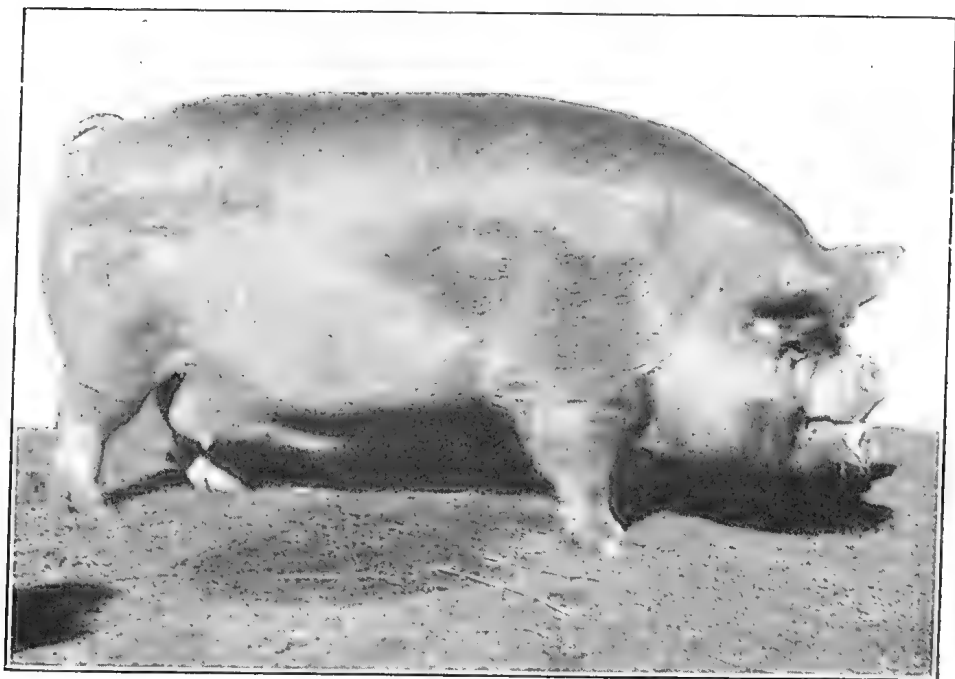


PLATE 70.—MID-YORK BOAR.

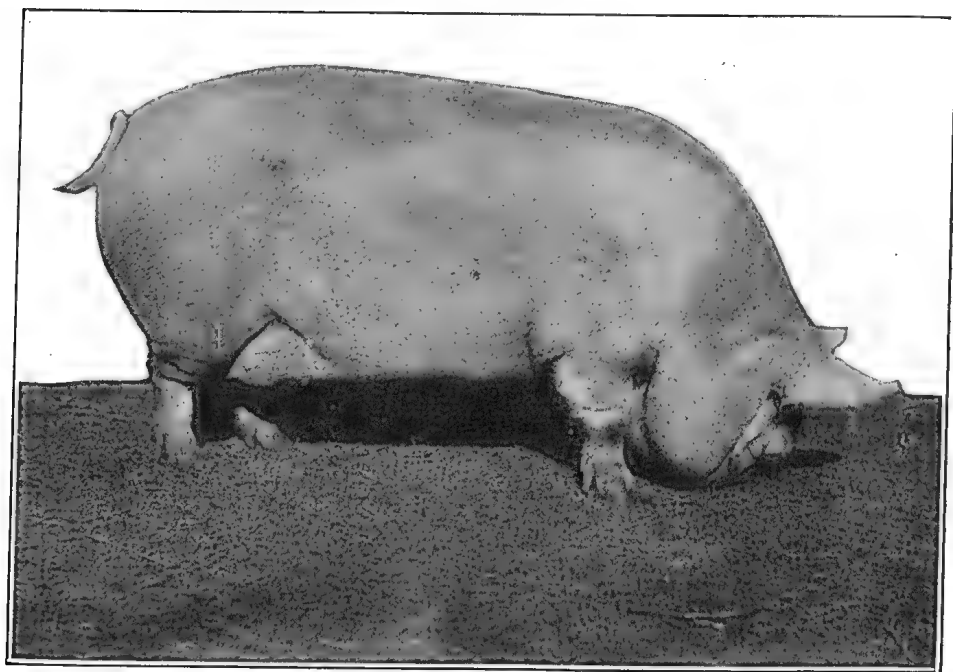


PLATE 71.—MID-YORK SOW.

AN OUTSIZE EGG.

"It is the biggest hen's egg I have ever seen," said the Government Poultry Expert, when displaying recently an enormous hen egg. Mr. Beard explained that the egg was laid by a Black Minorca hen, fifteen months of age, the property of Miss Paxton, of Kelvin Grove. The egg measured 9½ in. by 8½ in., and weighed 6¾ oz. One egg previously laid by the young Minorca weighed 4 oz. Nine days after laying her mammoth egg the hen died. The egg was opened by Mr. Beard in the presence of the owner, and it was found to contain another ordinary full-sized egg, perfectly shelled. The space between the shell of the big egg and that of the smaller one contained only albumen, no yolk, but the smaller egg contained the yolk, and no albumen. In only two previous instances has Mr. Beard known of such a freakish occurrence, but in neither of these previous cases was the egg nearly so large.

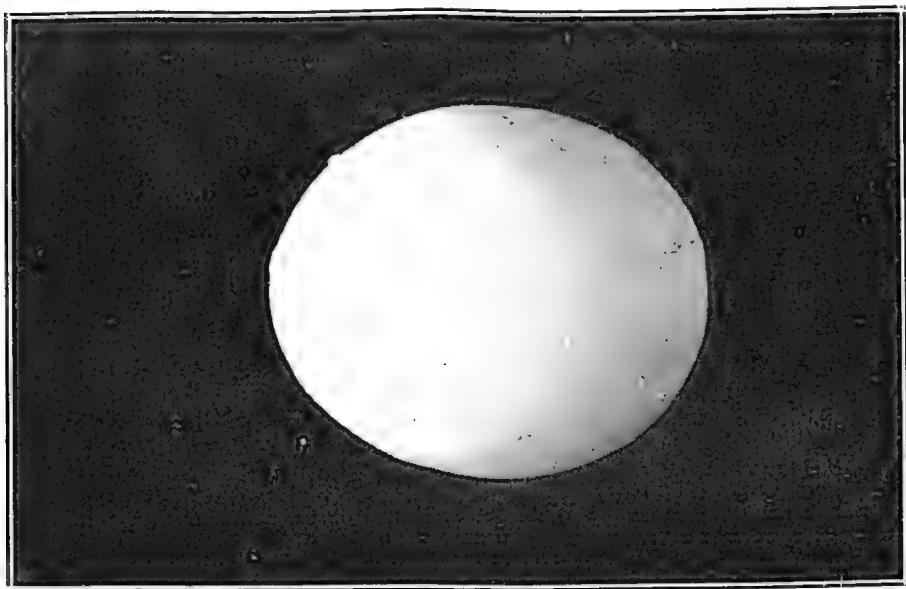


PLATE 72.

SMOKING OUT A PEST.

An Important Cotton Field Experiment.

An important and efficacious experiment in dealing with a cotton pest was conducted at Whinstanes, near Pinkenba, recently, in the presence of Messrs. G. Evans (Cotton Specialist, E.C.G.C.), W. G. Wells (Cotton Adviser), and C. Clydesdale (Assistant Instructor in Agriculture). On a Duranga seed (stud) plot of 5 acres there was a fine-looking crop, and since the late rains a new flush of flowers and squares had come along. It had been noticed, however, that a large proportion of the



PLATE 73.—SMOKING OUT A PEST—THE COTTON FIELD BEFORE FIRING.

squares were dropping off, and an examination disclosed that the crop had been attacked by a kind of worm.

Walking through the fields the experts discovered a moth that was there in countless numbers, and was busy laying eggs in the young squares. The grub was boring into the squares, and the boll was dropping off, which meant that all prospects of a good crop were being ruined. It was therefore deemed highly desirable to try

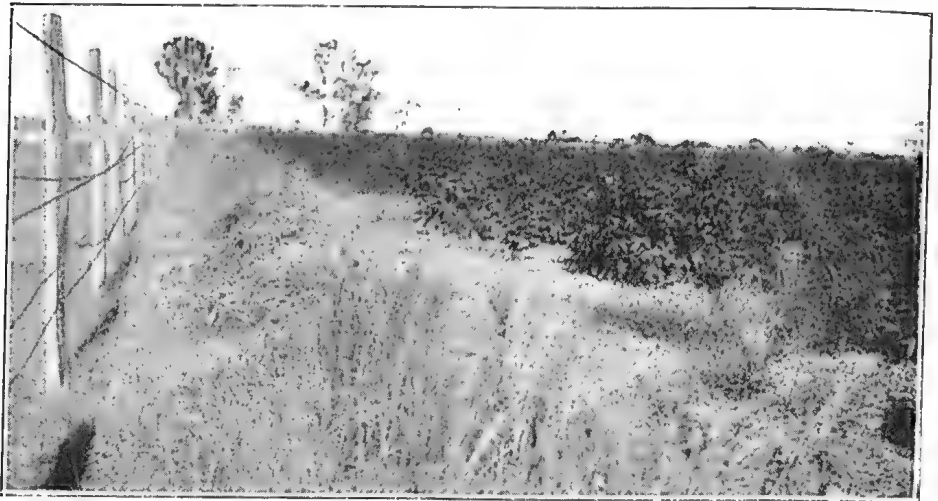


PLATE 74.—SHOWING STACK OF TARRED RUBBISH TO WINDWARD OF THE COTTON ROWS.

to drive out the moth before it affected all the squares. An experiment was arranged in the form of a small series of fires to windward of the plot. The fires were built up out of dead grass, leaves, and twigs, with a little coal tar added. This gave off dense smoke, which was carried through the plot by the wind, and had the effect of driving out all the moths. A flight of swallows followed the fugitives. The experiment was repeated in order to clear out any stray moths.

"This was an interesting experiment," said Mr. Evans, "and if, as we hope, it proves efficacious, it has the great advantage of being applicable on a large scale,



PLATE 75.—WELL ALIGHT.

and any farmer can adopt it. If the experiment had not succeeded the crop referred to would have been reduced 25 to 30 per cent."

There is a good lot of these insect pests on the coastal belt, he added, and there was going to be a stiff fight against them. The experiment was first tried in the Central district, where the maize worm had attacked a cotton crop. It was such a success that it was decided to repeat it to free cotton of the boll worm.

Further experiments will be carried out in the Dawson Valley. The accompanying illustrations show various phases of the experiment:—



PLATE 76.—A BURNING STACK.



PLATE 77.—AN EFFECTIVE SMOKE SCREEN.

HOW TO PICK COTTON.

Modern Methods.

Cotton picking is the great problem of the cotton growing industry, though certainly not the only one that will have to be contended with in Australia. Many attempts have been and are still being made to perfect a mechanical picker, but so far without much success. The best brains in America have devoted time and study towards solving this world-wide problem, without so far achieving any definite result.



PLATE 78.—COTTON SEVEN WEEKS OLD, W. KRAATZ'S FARM, TALLEGALLA.

Still, there is hope for the future, and it is quite possible that a mechanical picker can be perfected that will pick cotton for $\frac{3}{4}$ d. per lb. It has been pointed out that in pre-war days, in America, the cost of picking was $\frac{1}{2}$ d. per lb., and that at that price not much incentive was given to develop a picking machine. Now, however, with the rapid rise that has taken place in the cost of living in that country, and the



PLATE 79.—COTTON ELEVEN WEEKS OLD, W. KRAATZ'S FARM, TALLEGALLA.

consequent rise in wages and the cost of picking, inventors and engineers are now turning to the perfecting of a machine that will assist very materially the old hand method. Already in this country several people have taken up the problem of machine picking seriously, and Australians, with their proved inventive ability, can be relied upon to tackle the task, as they have others, that, on the surface, seemed impossible.

Hand Picking.

For the present the hand picking of cotton is the only way there is of harvesting the crop, and the British-Australian Cotton Association, Limited, furnishes the following useful hints and suggestions, which will enable pickers to do the work in the best way and with the least cost. Cotton picking may be a little tedious, but it is certainly not laborious. It calls for a quickness of the hand and eye, and a degree of physical strength not apparent to an onlooker. The methods of picking followed are numerous. In Queensland last season many people picked into kerosene tins, which were then emptied into large sacks. Others had a small bag that was fastened on in front of them and would hold about 10 lb. of cotton. The drawback of this method, as with the kerosene tins, is that one loses time emptying it, and the weight of the cotton is all on the body. This hampers movement.



PLATE 80.—THE 300TH OF THE GINNED BALES AT WHINSTANES FOR EXPORT TO LANCASHIRE.

Use Suitable Bags.

The usual American picker uses a canvas bag about 2 ft. wide and 8 ft. long. A simple, cheap, and very serviceable cotton picking bag to correspond to this can be made in the following manner:—Take two corn-sacks and sew them together from top to bottom, cutting the bottom of one. This will give a bag 8 ft. long. Tie a strap on top of this bag to go over the right shoulder so that the mouth of the bag is on the left side just above the hip. If the two ends of the strap are tied on to the bag, at a distance apart of less than half the circumference, the mouth of the bag will always stay open. This bag will cost 1s., can be made in a few minutes; and will be found to last for a considerable period. The bag is dragged on the ground between the rows behind the picker; there is no weight on the picker's shoulders; and it will hold about 40 lb. of cotton.

A Warning.

Many erroneous ideas exist here as to cotton picking, one being that cotton must be picked as soon as the boll opens. This, the Association points out, has resulted in pickers going over their fields numerous times, with the consequently low tally and high cost of picking. The cotton can remain on the bush for at least two or three weeks without being damaged. Nature protects the cotton fibre by enclosing it in wax, and the seed cotton is non-absorbent. A continuous rain for many days would,



Photo. by D. W. T.]

PLATE 81.—MR. JAMES TODD'S COTTON FIELD, MOUNTAIN VIEW, BIGGENDEN.



Photo. by D. W. T.]

PLATE 82.—A PROMISING COTTON CROP, MOUNTAIN VIEW, BIGGENDEN.



Photo. by D. W. T.]

PLATE 83.—AMONG THE FIELDS OF COTTON, MOUNTAIN VIEW, BIGGENDEN.



Photo. by D. W. T.]

PLATE 84.—THE MOUNTAIN VIEW HOMESTEAD.

of course, tend to stain the cotton and lower the grade, but a day or two of heavy rain, such as is likely to be experienced here, followed by a sunny day, would not stain or damage cotton. Field experts have seen a Queensland field of opened cotton, on which during May and June 10 in. of rain fell, and yet not over 1 per cent. of the cotton was damaged. Operators should wait until one-quarter or one-third of the cotton is open before starting to pick. Three pickings over the field will be all that is necessary; and the last one being made after the frost has checked the bush and opened all the green bolls.

Rough Grading in the Field.

In many cases two pickings will be quite sufficient, the first taking the biggest percentage of the crop. Do not mix the cotton from the separate pickings—send them to the gin as picked. The last picking after the frost has checked the bush is usually of a lower grade owing to the presence of immature cotton, and should always be sent to the ginnery separately, never mixed with the previous pickings.

How to Pick.

In picking, the operator should start on the outside row, and pick one row at a time. They will find faster picking can be done than by taking two rows at once. They should work their rows so that the long bag is dragging between two picked rows and so not damaging any open cotton bolls. The American picker wears leather knee pads, going on one knee to pick the bottom bolls. The art in cotton picking is to work with both hands, each independent of the other. The actual picking is not a straight pull out, but the fingers and thumb fit into the lock of the boll and the hand is given a twisting or levering motion, bringing the cotton away. A good picker will pick three or four bolls, keeping the cotton in his hand before transferring it to his bag. This is an economy of motion, and will save thousands of movements of the hand in a day. In commencing picking, get into the right method from the start; speed will come later. Pick with two hands at the same time. Avoid getting leaves and trash in with the cotton, and do not commit the worst cotton picking offence—leaving a part of the cotton in the open boll. Cotton left in this way is lost, as no picker could be expected to get these small pieces in a following picking. By leaving a small piece of cotton in every boll a good percentage of the crop would be left on the bushes. Pickers need not lose time in the morning waiting for the dew to dry. The cotton can be picked with the dew on it, but that cotton must be spread out in the sun and dried. After rain, wait until the cotton is dry before picking. Be careful not to pick green or immature cotton, that is, cotton from partly opened bolls. This cotton is damp, and can be instantly recognised from the fully matured and dry cotton. Cotton that is dry and from fully opened bolls requires no drying or treatment after being picked. It can be packed into bales or sacks in the field, so avoiding any unnecessary handling.

Packing.

The ordinary woolpack will hold about 350 lb. tramped in with the feet, the chaff sack about 90 lb. The Australian Cotton Association will return a woolpack to growers in place of the one received on receipt of 6d. each to cover handling and freight. No chaff sacks will be returned. Woolpacks cost about 3s. 6d. each, and can be used many times. All bales or sacks must be plainly branded with the grower's name and address. This will avoid confusion and the trouble of identifying packages. In the field a frame could be made to hold the woolpack, and the pickers empty their bags into it, and the cotton tramped into the bale. Where chaff sacks are used a slide about 3 ft. wide and 6 ft. long having a platform of this size 4 ft. from the ground will be found very serviceable. At one end of the platform is a circular opening with a hinged iron ring, to which the sack is fastened. The cotton is emptied out on to the platform and some one standing in the bag hole tramps it in. When the sack is full, the back of the bag hole is detached, releasing it. The advantage of this to the cotton packer is that being on a slide it can be hauled about to any part of the field, thus avoiding long carries by the pickers of their full bags.

Pickers' Prospects.

The amount of cotton picked in a day depends on the ability and quickness of the pickers, the yield per acre, and the cleanliness of the crop. A field free from weeds means a cheaply picked crop, and this fact should not be lost sight of in the growing and cultivation of cotton. In starting out, if a man picks around 75 lb. in eight hours, he will be doing very well. Speed will come with experience, and in a few weeks he should work up to 100 lb., and if he is going to make a cotton picker will surpass this figure in good average cotton. Growers should have in the field a scale to weigh the pickers' cotton as they bring their bags in, and three or four weighings during the day will be found quite sufficient.

The acreage of cotton that one man will be able to pick will, of course, depend in great part on the yield per acre, and his ability. A man who can devote all his time to picking will be able to handle 8 acres. This is taken for a very conservative case of a yield of 800 lb. of seed cotton to the acre, and an average daily picking of 80 lb. This crop would require 80 days' picking, and allowing 20 working days to the month, this will mean continuous work for four months, which is the average length of the picking season in this country. White American pickers do from 150 to 200 lb. a day, and it is felt to be certain that Australians, when they take up cotton picking seriously, will equal, if not surpass, this. The best cotton picker one expert ever saw was an American, who averaged 300 lb. for a nine-hour day over a considerable period. This was done in a field that went 2,300 lb. seed cotton to the acre, and in which only two pickings were made. He points out that this is, of course, an exceptional record.

Fire Prevention.

Great care must be taken to avoid getting matches, pieces of metal, or other material in with the cotton. The cotton is very inflammable, and a spark in the machine during the process of ginning, will instantly cause a fire. The gin is a series of small circular saws, set close together on a spindle, and running between steel ribs, so that a match or piece of metal striking the saws may result in a fire, the metal also damaging the teeth of the saw. Last season many fires occurred in the gins at Whinstanes and Rockhampton, due, in every case, to foreign material in the seed cotton. The collection of articles rescued from last season's cotton was wide and diversified, ranging from pumpkins and eggs to watches and clothing. Corn cobs are a source of much trouble, as they are readily carried to the saws by the fibres adhering to them, and holding them against the breast, thus causing great damage to the saws, the teeth of which are thus broken. The bagging of the cotton in the field as suggested will avoid the inclusion of these articles, and growers should prohibit the use of wax matches by pickers or any one handling the cotton. A spark from a cigarette falling into a bag of cotton may smoulder away for days before reaching the air, and bursting into flames. This matter is important, and too much care cannot be taken to lessen the risk of fire in cotton gins.

DENTITION OF SHEEP.

Age.		Incisors.		Molars.		Number.	
TEMPORARY.							
Period.	No.	Position.	No.	Position.	Temp.	Perm.	Total.
At birth or soon after	2	Central	..	..	..	..	..
	2	Lateral	..	..	..	..	..
	..	Central	..	..	20	..	20
	2	Lateral	12	1st, 2nd, 3rd	..	..	..
	2	Corner	..	..	..	..	..
PERMANENT.							
3 months .. ..	..	..	4	4th	20	4	24
9 months .. ..	..	..	4	5th	20	8	28
Early.	Late						
Yr. m.	Yr. m.						
1 0	1 4	2	Central	..	18	10	28
1 6	2 0	2	{ Lateral Central	{ 16	6th and 1st, 2nd, 3rd	4	28
2 3	2 9	2	Lateral	..	2	30	32
2 9	3 3	2	Corner	..	0	32	Full mouth

Formula of Temporary Teeth.

$$\begin{array}{ccc} \text{M.} & \text{I.} & \text{M.} \\ 3 & 0 & 3 \\ \hline 3 & 8 & 3 \end{array} = \frac{6}{14} = 20.$$

Formula of Permanent Teeth.

$$\begin{array}{ccc} \text{M.} & \text{I.} & \text{M.} \\ 6 & 0 & 6 \\ \hline 6 & 8 & 8 \end{array} = \frac{12}{20} = 32.$$

MAJOR A. H. CORY, M.R.C.V.S.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, MARCH, 1923.

Owing to the dates on which the Easter holidays fell this year, all birds were held until 3rd April, the eggs being counted up to the evening of 2nd, thus making the period of laying 365 days. The weather at the beginning of March was very warm, with hot winds, giving the birds a bad time. There were four deaths, two from apoplexy, one from bowel trouble, and one from peritonitis. The egg production for the year was very satisfactory considering the poor start made at the beginning of the contest. The laying of the light breeds was good, there being very few cases of broodiness to be recorded. On the other hand, with the exception of a few pens, there was a great deal of broodiness amongst the heavy breeds. The team owned by R. Burns finished well, none of his birds having been broody. Mr. N. A. Singer's B bird was still going strong at the close, with 311 eggs, and looked like continuing for another term. The following are the individual records:—

Competitors.	Breed.	March.	Total.
LIGHT BREEDS.			
*N. A. Singer	White Leghorns ...	113	1,604
C. H. Singer	Do.	109	1,551
*W. and G. W. Hindes	Do.	87	1,450
*Bathurst Poultry Farm	Do.	93	1,352
*S. L. Grenier	Do.	86	1,311
*R. Gill	Do.	79	1,306
*J. M. Manson	Do.	78	1,293
*Mrs. L. Andersen	Do.	87	1,287
*W. Becker	Do.	73	1,273
*H. P. Clarke	Do.	68	1,272
*J. W. Newton	Do.	61	1,235
*G. Trapp	Do.	35	1,232
*W. A. Wilson	Do.	62	1,225
*F. Birchall	Do.	104	1,204
*G. Williams	Do.	47	1,166
*C. Goos	Do.	44	1,162
A. G. C. Wenck	Do.	70	1,162
*R. C. J. Turner	Do.	52	1,157
*R. C. Cole	Do.	51	1,155
*Oakleigh Poultry Farm	Do.	48	1,148
J. H. Jones	Do.	34	1,145
*O. Goos	Do.	56	1,126
*Thos. Taylor	Do.	89	1,122
*H. Fraser	Do.	70	1,121
*Mrs. R. Hodge	Do.	54	1,090
*Mrs. E. White	Do.	57	1,079
*T. Fanning	Do.	25	1,078
N. J. Nairn	Do.	32	1,070
*J. W. Short	Do.	54	1,064
*M. F. Newberry	Do.	35	1,048
*C. M. Pickering	Do.	50	1,038
*E. A. Smith	Do.	68	1,034
B. Hawkins	Do.	40	1,019
A. Maslin	Do.	51	1,011
T. H. Craig	Do.	18	1,002
J. Purnell	Do.	53	989
E. Symons	Do.	69	967
E. Stephenson	Do.	57	951
H. Trappett	Brown Leghorns ...	43	941
G. F. Richardson	White Leghorns ...	20	933
B. C. Bartlem	Do.	23	904
A. Anders	Do.	39	901
Brampton Poultry Farm	Do.	26	879
Parisian Poultry Farm	Brown Leghorns ...	16	590

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	March.	Total.
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	127	1,488
*A. E. Walters	Do.	72	1,216
*C. C. Dennis	Do.	85	1,165
*T. Hindley	Do.	67	1,156
*R. Holmes	Do.	65	1,119
*E. F. Dennis	Do.	56	1,097
Jas. Hutton	Do.	43	1,092
Mrs. A. Kent	Do.	69	1,068
Mrs. A. E. Gallagher	Do.	65	1,050
H. B. Stephens	Do.	86	1,044
*H. M. Chaille	Do.	45	1,033
Mrs. L. Maund	Do.	62	1,028
*Parisian Poultry Farm	Do.	83	987
*Jas. Potter	Do.	52	980
R. Innes	Do.	18	977
Wambo Poultry Farm	Do.	82	944
V. J. Rye	Do.	58	944
W. Becker	Chinese Langshans ...	35	911
C. Doan	Black Orpingtons ...	37	901
*Rev. A. McAllister	Do.	27	901
C. Rosenthal	Do.	65	870
Jas. Hitchcock	Do.	50	858
W. C. Trapp	Do.	56	801
R. Burns	Silver-laced Wyandottes	32	713
*J. E. Smith	Plymouth Rocks ...	19	639
*Miss L. Hart	Rhode Island Reds ...	21	534
Total ... ..	...	4,003	75,163

* Indicates that the pen is being single tested.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total
LIGHT BREEDS.							
N. A. Singer	226	311	237	281	254	295	1,604
W. and G. W. Hindes	253	222	245	238	258	234	1,450
Bathurst Poultry Farm	173	217	242	239	268	213	1,352
S. L. Grenier	201	166	228	227	240	249	1,311
R. Gill	246	219	245	236	153	207	1,306
J. M. Manson	235	176	222	198	236	226	1,293
Mrs. L. Andersen	245	179	226	213	222	202	1,287
W. Becker	201	170	223	214	228	237	1,273
H. P. Clarke	217	205	201	232	207	210	1,272
J. W. Newton	222	211	244	194	204	160	1,235
Geo. Trapp	222	184	212	238	176	200	1,232
W. A. Wilson	215	189	158	223	214	226	1,225
F. Birchall	198	229	170	154	237	216	1,204
G. Williams	183	208	213	207	191	164	1,166
C. Goos	142	177	188	215	254	186	1,162
R. C. J. Turner	195	169	219	202	203	169	1,157
R. C. Cole	231	182	213	161	187	181	1,155
Oakleigh Poultry Farm	203	160	205	179	191	210	1,148
O. Goos	185	179	206	223	203	130	1,126
Thos. Taylor	202	164	190	194	194	178	1,122
H. Fraser	197	215	192	153	155	209	1,121

EGG-LAYING COMPETITION—continued.
DETAILS OF SINGLE HEN PENS—continued.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS—continued							
Mrs. R. Hodge	227	154	171	157	229	152	1,090
Mrs. E. White	197	124	231	148	153	226	1,079
T. Fanning	135	183	203	172	235	150	1,078
J. W. Short	170	166	209	158	186	175	1,064
M. F. Newberry	179	152	161	234	137	185	1,048
C. M. Pickering	203	211	113	163	176	167	1,038
E. A. Smith	163	157	181	192	162	179	1,034
HEAVY BREEDS.							
R. Burns	238	241	229	278	244	258	1,488
A. E. Walters	199	158	164	203	260	232	1,216
C. C. Dennis	183	205	202	180	197	198	1,165
T. Hindley	165	197	130	257	238	169	1,156
R. Holmes	151	209	209	180	175	195	1,119
E. F. Dennis	164	188	213	110	205	217	1,097
H. M. Chaille	189	168	199	162	195	120	1,033
Parisian Poultry Farm	123	160	198	134	180	192	987
J. Potter	158	177	182	144	183	131	980
Rev. A. McAllister	158	183	159	113	95	193	901
Miss L. Hart	81	111	64	126	76	76	534

CUTHBERT POTTS, Principal.

**NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION
 COMPETITION, ZILLMERE.**

FINAL REPORT.

The 1922-23 Zillmere Single Pen Competition was concluded on 31st March. In order to permit of the pens being thoroughly cleansed before the new competition, all birds which were not in a leading position were returned shortly after the middle of the month. This accounts for the apparently low scores recorded by some of the birds this month. The highest individual score for the period of the competition was 295 by a white Leghorn, the property of Mr. J. J. Davies, of Mount Gravatt. Another Leghorn held second place with 281 eggs. Mr. A. Cowley, of the Soldiers' Settlement, Enoggera, being the owner. In the black Orpington section Mr. E. F. Dennis, Kelvin Grove, won with a bird laying 267 eggs, while Mr. T. J. Carr, of King's Creek, was successful in the other varieties with a silver-laced Wyandotte, which laid 219. Certificates were given for all birds laying 250 eggs and over, the following owners being successful:—

WHITE LEGHORNS.

A. Neil, Cannon Hill	256
J. Hutton, Kingsthorpe	260
Oakleigh Poultry Farm, Sunnybank	264
J. Purnell, Torwood	272
P. J. Fallon, Toowoomba	255
J. J. Davies, Mount Gravatt	295
W. H. Lingard, Greenslopes	251
H. Sturman, Birkdale	252
H. Sturman, Birkdale	268
G. Trapp, Toowoomba	258
G. Trapp, Toowoomba	275
A. Cowley, Enoggera	281
R. D. Chapman, Newmarket	262
A. Hodge, Kelvin Grove	263

BLACK ORPINGTONS.

C. C. Dennis, Yeronga	251
E. F. Dennis, Kelvin Grove	267
R. A. Boulton, Deagon	251

Mr. H. Sturman, Birkdale, wins the winter aggregate for first four months of competition, and Mr. J. J. Davies, Mount Gravatt, the aggregate for the period of the competition with 540 eggs. The light variety type prize went to Mr. M. J. Lyons, Fig-tree Pocket, and heavy variety type prize to Mr. H. Pearce, Nundah.

Details:—

Pen No.	Owner.	March.	Total.	Pen No.	Owner.	March.	Total.

WHITE LEGHORNS.

43	J. J. Davies ...	23	295	14	J. Hutton ...	22	217
29	A. S. Walters ...	19	286	20	L. Andersen ...	13	215
66	A. Cowley ...	20	281	49	R. Turner ...	6	215
64	G. Trapp ...	20	275	9	P. Ruddick ...	10	214
34	J. Purnell ...	22	272	73	A. F. Knowles ...	12	207
7	J. Harrington ...	22	269	80	W. Bliss ...	17	207
62	H. Sturman ...	17	268	19	L. Andersen ...	0	205
27	Oakleigh Poultry Farm	18	264	22	E. Stephenson ...	6	204
70	A. Hodge ...	18	263	76	A. J. Bourne ...	12	204
68	R. D. Chapman ...	24	262	16	T. Flood ...	14	204
13	J. Hutton ...	22	260	8	J. Harrington ...	12	204
53	A. W. Ward ...	18	259	78	Kelvin Poultry Farm	15	203
63	G. Trapp ...	20	258	57	M. Newberry ...	4	202
1	A. Niel ...	0	256	36	Parisian Poultry Farm	7	197
39	P. J. Fallon ...	16	255	82	E. C. Raymond ...	11	195
25	P. F. Adams ...	15	253	31	R. H. Woodcock ...	12	193
79	W. Bliss ...	16	253	59	C. Pickering ...	13	193
61	H. Sturman ...	17	252	17	R. Shaw ...	5	192
55	W. H. Lingard ...	21	251	11	J. Potter ...	4	188
52	F. R. Koch ...	18	250	5	Wombo Poultry Farm	6	188
12	J. Potter ...	16	248	6	Wombo Poultry Farm	0	186
44	J. J. Davies ...	16	245	3	W. Becker ...	4	186
77	Kelvin Poultry Farm	9	244	81	E. C. Raymond ...	3	182
72	Enroh Pens ...	9	241	38	Carinya Poultry Farm	0	179
24	M. H. Campbell ...	22	241	48	M. J. Lyons ...	0	176
54	W. Ward ...	19	240	65	A. Cowley ...	1	176
40	P. J. Fallon ...	15	239	15	T. Flood ...	9	175
23	M. H. Campbell ...	19	239	60	C. Pickering ...	12	169
10	P. Ruddick ...	14	237	22	R. Stephenson ...	11	166
33	J. Purnell ...	9	233	71	Enroh Pens ...	2	166
46	H. Needs ...	12	231	75	A. J. Bourne ...	1	162
56	W. H. Lingard ...	20	229	50	R. Turner ...	1	161
18	R. Shaw ...	16	227	45	H. Needs ...	0	154
26	P. F. Adams ...	9	227	4	W. Becker ...	2	154
67	R. D. Chapman ...	1	225	69	A. Hodge ...	1	136
35	Parisian Poultry Farm	12	222	32	R. H. Woodcock ...	0	128
47	M. J. Lyons ...	13	221	74	A. F. Knowles ...	0	123
41	G. Williams ...	12	220	28	Oakleigh Poultry Farm	0	107
51	F. R. Koch ...	16	223	2	A. Niel ...	17	59
58	M. Newberry ...	15	219				
37	Carinya Poultry Farm	9	218				
30	A. S. Walters ...	17	217				

**NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION
COMPETITION. ZILLMERE—continued.**

Pen No.	Owner.	March.	Total.	Pen No.	Owner.	March.	Total.
BLACK ORPINGTONS.							
92	C. C. Dennis ...	12	275	87	W. A. Blake ...	2	185
88	W. A. Blake ...	15	274	100	L. J. Pritchard ...	0	184
93	E. F. Dennis ...	23	267	104	J. Potter ...	7	180
96	R. A. Boulton ...	6	251	86	Kidd Bros. ...	0	179
91	C. C. Dennis ...	18	251	109	Wambo Poultry Farm	14	169
108	E. Walters ...	16	248				
89	T. Brotherton ...	9	234	102	Parisian Poultry Farm	0	167
111	A. Niel ...	18	230				
105	H. Pearce ...	15	225	98	Enroh Pens ...	9	166
107	E. Walters ...	4	219	110	Wambo Poultry Farm	0	165
95	R. A. Boulton ...	0	214				
101	Parisian Poultry Farm	13	213	83	J. Hutton ...	1	158
				97	Enroh Pens ...	1	157
103	J. Potter ...	7	204	90	T. Brotherton ...	1	162
84	J. Hutton ...	17	204	99	L. J. Pritchard ...	0	131
112	A. Niel ...	19	197	94	E. F. Dennis ...	3	117
106	H. Pearce ...	17	191	85	Kidd Bros. ...	0	10

OTHER BREEDS.

120	T. J. Carr (S.W.)	20	229	114	Parisian Poultry Farm (B.L.)	16	182
119	T. J. Carr (S.W.)	16	219				
116	G. and W. Hindes (B.L.)	6	194	118	J. H. Jones (W.W.)	4	180
				113	Parisian Poultry Farm (B.L.)	5	141
115	G. and W. Hindes (B.L.)	18	192	118	J. H. Jones (W.W.)	0	120

TO POULTRY KEEPERS.

Notwithstanding repeated warnings by the Queensland Society for the Prevention of Cruelty and public reproaches in the Press, crates of poultry continue to be consigned to market under conditions involving cruelty.

Thoughtful persons, for their own protection and in order to secure the best returns for their consignments, will follow the undermentioned directions when consigning poultry to market:—

1. Be sure that the crate is not overcrowded. (Why kill your birds prematurely?)
2. Be sure that there is ample ventilation. (A plain framework crate with wire netting sides and wire netting top, which must not sag, is the best. The public buys best what it sees best. If a wooden crate is used see that ventilation is supplied from the sides as well as from the top.)
3. Be sure that there is room for all birds in the crate to stand upright. (They must have headroom. All birds in one crate should be as nearly equal in size as possible. There will be fewer casualties, and they will look better to buyers, who are inclined to judge by the small ones.)
4. Be sure that there are no gaps between the flooring boards of the crate where birds may get their feet crushed or their legs broken. (Damaged goods are bad sellers.)
5. Be sure that water is available in the crate. (A loose tin is worse than useless. Fix syrup tins at opposite corners of the crate and see that they are filled with clean water before trucking. Your agent can also easily fill them on arrival.)
6. Be sure that food is also supplied in a fixed tin for a long journey. (A drooping, thirsty, or starving bird is a bad seller.)

7. Be sure that while waiting for consignment your birds are not left exposed to rain, wind, or sun. (You can't depend on the porter.)
8. Be sure that you do not deliver fowls, or any other birds, tied together by the legs. (We'll give you no second warning.)
9. Be sure that you do not get prosecuted for cruelty by neglecting to follow the foregoing advice. (We have inspectors at the markets every day, and court cases are costly in time, money, and reputation.)

Issued by the Queensland Society for the Prevention of Cruelty, 14 Fitzroy Buildings, Adelaide street, Brisbane. Telephone Central 647.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS FOR FEBRUARY, 1923.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Pretty Maid of Haremar	Ayrshire ...	11 Sept., 1922	750	3.9	34.20	
Bellona ...	" ...	30 Aug., "	690	4.2	33.90	
Royal Mistress ...	" ...	25 Nov., "	750	3.5	30.60	
Confidence...	" ...	13 Aug., "	630	4.0	29.40	
Songstress ...	" ...	4 July, "	570	4.2	28.20	
College Meadow Sweet	Friesian ...	18 Sept., "	690	3.4	27.30	
Lady Peggy ...	Ayrshire ...	18 Dec., "	750	3.1	27.0	
Miss Fearless ...	" ...	30 May, "	528	4.3	26.40	
College Mignon ...	Jersey ..	20 Nov., "	480	4.6	25.80	
Thyra of Myrtleview	Ayrshire ...	22 Aug., "	540	4.0	25.20	
Yarraview Snowdrop	Guernsey ...	1 Sept., "	420	4.9	24.30	
College La Cigale	Jersey ...	10 July, "	330	5.7	22.20	
Fair Lassie ...	Ayrshire ...	1 Sept., "	480	4.0	22.20	
Hedges Nattie ...	Friesian ...	20 May, "	441	4.3	22.05	
Nina ...	Shorthorn...	12 Jan., 1923	630	3.0	21.90	
Hedges Dutchmaid	Friesian ...	23 Sept., 1922	510	3.4	20.10	

TREATMENT OF CATTLE SUFFERING FROM THE EFFECTS OF EATING THE WILD PASSION VINE.

It is very obvious that so long as the animals are continually eating the vine, curative measures are only of temporary value. The first measures, therefore, should be taken to prevent the cattle gaining access to the vines. On farms where grazing land is scarce, efforts should be made to get rid of the injurious weed by cultivation or otherwise. This is by no means an impracticable task. The vine grows most luxuriantly in the newly-felled scrub, and such land is useless until such noxious weeds have been eradicated.

With regard to treatment of affected animals: First remove them to fresh quarters so that they are unable to obtain any more vines. They should then be given a drench of 1½ pints of linseed oil, by the mouth, in order to loosen the bowels. Epsom salts are not advisable, as in some cases there is inflammation of the bowels present. Working bullocks should be spelled until recovered. With animals in what may be termed the first stages of the disease—that is, those showing drowsiness and stupor, loss of appetite and condition, &c.—the best remedy is the injection of 18 drops or 1 c.c. of 1 per cent. solution of strychnine under the skin behind the shoulder once a day for a few days (four or five) by means of a hypodermic syringe.

For animals in the later stages, that is where convulsions are appearing, a sedative in the form of 6 drachms of Bromide of Potassium in a pint of water should be given as a drench, providing the animal is able to swallow, but it appears that in some cases this ability is lost. In such cases no drenches should be given at all, owing to the danger of the liquid going the "wrong way" and so setting up inflammation of the lungs. The strychnine should be recommended when the convulsions have disappeared.—Major A. H. Cory, M.R.C.V.S.

THE QUEENSLAND PRODUCERS' ASSOCIATION.

THE WORK OF THE PROVISIONAL COUNCIL OF AGRICULTURE REVIEWED.

A Year of Organisation and Achievement.

On 24th March, 1922, the scheme for the organisation of the Agricultural Industry in Queensland was propounded by the Premier (Hon. E. G. Theodore), at a Conference of Representatives of Dairying Interests within the State, at Brisbane. That gathering was one of the most notable in the history of Queensland and its decisions were of first importance to all engaged in rural pursuits. Out of the Premier's proposals has grown the Queensland Producers' Association, now statutorily established, and which, through its Local Producers, District Councils, and Council of Agriculture, has already laid the foundations of complete agricultural organisation within this State.

The Provisional Council of Agriculture has now handed over the guidance of the Association to the incoming Standing Council of Agriculture elected recently by the Organised Farmers of Queensland.

Subjoined is a review of definite achievements of the Provisional Council in the course of its year of service.

Agriculturists in many lands have been more or less a disunited body, but it is doubtful whether any country can boast of such a comprehensive and generous scheme of agricultural organisation as that which has been made available to the primary producers of Queensland.

The necessity for agricultural organisation had, for some time, been realised, and ultimately it was resolved by the present Government to adopt the policy of placing the farmers themselves, by organisation and State backing, in the position to give consideration to their own problems, and to evolve solutions which would be satisfactory to them. An organisation was created to embrace all agriculturists engaged in all branches of the industry and all shades of political opinion. The scheme was brought to fruition when the dairying industry was passing through a period of depression, and the outline of the Premier's proposals was submitted to a Dairy Conference held in Brisbane on the 24th March, 1922, and was unanimously approved by that conference. It was next decided to obtain legislation to govern the scheme, whereupon the Primary Producers' Organisation Act, and other agricultural legislation, introduced by the Minister for Agriculture and Stock (Hon. W. N. Gillies), was passed by Parliament in the 1922 session. The scheme embraced the following main features:—

Local Producers' Associations would form in every centre. A minimum of fifteen primary producers may form themselves into a Local Producers' Association. Every primary producer is eligible for membership.

The State is divided into nineteen districts, and all Local Producers' Associations have the right to elect the District Council.

Each of the nineteen District Councils will appoint one member to the Council of Agriculture, which holds its meetings in Brisbane.

Each District Council will have a permanent officer, known as the District Agent, who will study the problems of his district, and assist growers, Local Producers' Associations, and the District Council in improving their conditions generally. The first duly elected Council of Agriculture has now been constituted as from the 23rd

March, 1923, and will hold office until the 30th June, 1924. It is made up as follows:—

OFFICIAL REPRESENTATIVES.

The Minister (President), Department of Agriculture and Stock.
 James Walker Davidson, Commissioner for Railways, Brisbane.
 Arthur Ernest James Charles King Graham, Director of Dairying, Brisbane.
 Harold Cecil Quodling, Director of Agriculture, Brisbane.
 William Joseph James Short, General Manager, Bureau of Central Sugar Mills, Brisbane.
 John Douglas Story, Public Service Commissioner, Brisbane.

Districts as per Order in Council
 of 21st December, 1922.

Name of Representatives elected to Council of Agriculture.

No. 1	..	..	George Henry Pritchard, Secretary, Australian Sugar Producers' Association, Edward street, Brisbane.
No. 2	..	..	William Barron Biggs, Earnestholme, Proserpine.
No. 3	..	..	Thomas Alfred Powell, Foulden, Mackay.
No. 4	..	..	Alexander Evans, Wilmott, <i>via</i> Larecom.
No. 5	..	..	William George Batchler, Oakwood, Bundaberg.
No. 6	..	..	Robert Livingstone Boyd, Wetheron House, Byrnestown.
No. 7	..	..	Joseph T. Tatnell, Deep Creek, Gympie.
No. 8	..	..	James Henry Sigley, Kingaroy.
No. 9	..	..	Thomas Henry Brown, Montville.
No. 10	..	..	Charles Bateman, Evandale, McMaster street, Nundah.
No. 11	..	..	Frederick Matthew Ruskin, Zillmere.
No. 12	..	..	Thomas Flood Plunkett, Beau Pare, Beaudesert.
No. 13	..	..	John Hardecastle, Dugandan.
No. 14	..	..	Thomas Cornelius Hayes, Laidley.
No. 15	..	..	George Burton, Ramsay road, Cambooya.
No. 16	..	..	James Theodore Tod, Goomburra.
No. 17	..	..	William Ranger, Eukey, <i>via</i> Stanthorpe.
No. 18	..	..	Allan McKinlay, Gowrie Junction.
No. 19	..	..	Robert Swan, Wallumbilla.

The State Government generously undertook to finance the whole of the organisation for the first twelve months, and a grant of £25,000 was made available to cover operations to the 30th June, 1923. The Act further provides that for the first five years the Government will subsidise the amount subscribed by agriculturists to the extent of at least £1 for £1.

With the one exception of the Director, the Council appoints all its own officers, and administers, without any direction from the Government, all the funds placed at its disposal.

During the past twelve months, a Provisional Council has been acting, and its first meeting was held on the 19th April, 1922. At this meeting the Premier (Hon. E. G. Theodore) outlined the action leading up to the constitution of the Council, and pointed out it would be the duty of the Provisional Council to lay down the policy to be pursued. A committee was appointed to draw up a plan of organisation, and it was decided to appoint a Director to organise the whole scheme. Nine delegates were appointed to visit agricultural centres and expound the scheme. Later fifteen Provisional District Agents were appointed. These called meetings and explained the proposals and the way they were designed for the betterment of the agricultural industry. That success has attained these preliminary efforts will be manifest when it is stated that there are now over 700 Local Producers' Associations with a membership of 20,000.

SPECIFIC PROBLEMS DEALT WITH—ARRANGED UNDER SECTIONAL INDUSTRIES.

DAIRYING.

Herd Improvement—Federal Aid.

The last Commonwealth Government promised to pay cost of transport and quarantine of pure bred stock imported into Australia, and the present Government has been requested to ratify that promise.

State Aid.

The State Government invited the Council to make suggestions in connection with a proposed amendment of the Co-operative Agricultural Production and Advances to Farmers Act, and the Council submitted concrete suggestions relative to the making available of advances for the purpose of purchasing pure bred stock.

Herd Book Societies.

Efforts have been made to secure the adoption of suitable rules by the various Herd Book Societies. Representatives of these societies have met representatives of the Council, and the question is still under review.

Herd Testing.

The Council is circulating, through Local Producers' Associations and other bodies, full information relating to herd testing and its advantages.

The methods adopted in the testing of herds by the Department of Agriculture and Stock have been approved, and Local Producers' Associations, in dairying districts, have been asked to promote herd testing on that basis. Two additional herd testers have been appointed by the Government, and farmers are now taking advantage of the opportunity to test the individual value of their milkers.

Fodder Conservation—Vital Necessity.

The Council recognises the necessity of fodder conservation, and has prepared a practical scheme.

Dairy Buildings.

At the request of the Council the Government has prepared plans of dairy buildings for distribution to producers. The Council has also approved of proposed amendments of the Regulations relating to size of buildings, and has secured modification in the prescribed drainage.

Milking Machines.

The Council requested the Department to take action to secure the cleanliness of milking machines, and the Department has given effect to the recommendation.

Cream Containers.

The Council has co-operated with the Queensland Co-operative Dairy Companies' Association in advocating the use, on dairy farms, of standard seamless containers protected by fly-proof gauze covers, and the various factories have co-operated in securing their general use.

Pasteurisation.

Information regarding pasteurisation of milk and cream has been collected from New Zealand and elsewhere, and the Council has advocated the installation of pasteurisers, where found necessary, in Queensland. The Co-operative Dairy Companies and Cheese Manufacturers' Associations have been asked to assist.

Co-ordination of Factories.

In the matter of the proposed erection of additional butter factories in districts where a factory was already in existence, the Council was able to effect an agreement between the parties concerned and to avoid duplication of plant and effort.

Uniform System of Accounts.

Recognising the necessity of a uniform system of accounts for dairymen and dairy factories, the Council employed a committee of experts to draw up a comprehensive system of accounts to comply with all the conditions required, and the Council has approved that copies of the report with full explanations be sent to all factories. The report is being printed, and will be circulated without delay.

Metropolitan Milk Supply.

The Council has conferred with the Metropolitan Milk Suppliers' Association in regard to the more economic means of distribution of milk, and has drawn up definite rules for the constitution of a milk pool for the metropolitan area. This scheme has been forwarded to the Government with a request that action be taken to create the pool.

Railway Transport.

As a result of the Council's representations the Commissioner for Railways decided to make an all-round reduction of 20 per cent. on the freight of dairy produce. The Council has further brought under the notice of the Railway Commissioner the need of improving the design and increasing the number of trucks suitable for the carriage of dairy produce, and of taking proper precautions for ensuring that such produce would not deteriorate in value through faulty transport arrangements. These matters have received satisfactory attention.

Stabilisation of Prices.

Various attempts have been made to induce the proprietary factories in Victoria to join a scheme for the stabilisation of prices of dairy produce throughout Australia. Delegates have been sent to Victoria, and during their visits to the Southern States were asked to make strong representations in favour of stabilisation. The proprietary factories have not yet consented to join the scheme, but the matter is still being advocated energetically.

Grading of Dairy Produce.

The present practice of dual grading of dairy produce by Federal and State officers is considered to be very unsatisfactory, and the Council has recommended that all dairy produce should be graded by State officials acting for and on behalf of the Federal Government. This decision has been forwarded to the Minister for Agriculture for discussion at the next conference of Ministers for Agriculture, to the Minister for Trade and Customs, and to the State Dairy Standardisation Committee, for discussion at the next meeting of the Federal Council.

Cold Storage.

Through the action of the Council of Agriculture, the construction of Cold Stores at Hamilton was expedited, and at the request of the Council the control of these cold stores has been vested in the Minister for Agriculture and Stock, and the installation of a butter worker has been approved.

Cheese.

The Minister for Agriculture and Stock has agreed that, in order to obviate injury in transit, all cheese intended for export be crated at the factories.

Representation has also been made to the Government with the object of securing to the Cheese Pool Board the effective control of the industry.

Pigs.

Applications from pig raisers have been made for stabilisation of prices in their industries, and several suggestions have been made in regard to marketing of pigs. The question of constituting a Pig Pool for certain districts is under consideration, and the Council is in communication with the Local Producers' Associations in those districts in reference to the formation of such a pool.

Agent-General's Reports.

The Agent-General has been asked to furnish complete reports on the conditions surrounding the handling, marketing, and distribution of Queensland dairy produce in London, and reports are now being regularly received.

Tariff.

The Tariff Board has been interviewed in reference to reducing the tariff on the import of dairying machinery, and with the object of increasing the import duty on dairy produce from New Zealand.

Additional Officers.

Through the efforts of the Council additional Dairy Instructors and Inspectors have been appointed for the benefit of the industry generally.

DEVELOPMENT OF THE WHEAT INDUSTRY.

The Council, in conjunction with the Department of Agriculture and Stock and the State Wheat Board, has formulated a scheme for the improvement of wheat-growers in Queensland.

The scheme provides for the purchase by the Wheat Board from the Department of Agriculture and Stock of a quantity of specially selected seed which will be grown under special conditions. Wheat so grown will be reserved for seed purposes.

A new list of recommended varieties has been drawn up, and these varieties have been allotted to certain districts where each will be planted on specific classes of soil.

The Council recommended that assistance be given to needy farmers in want of seed wheat for planting, and, as a result, the Department of Agriculture and Stock has arranged accordingly with the State Wheat Board.

MAIZE.

With the view of organising maizegrowers, the Department of Agriculture and Stock, on the recommendation of the Council, arranged to collect statistical and other information for the purpose of enabling the Council to prepare a concrete scheme for the betterment of the conditions of the maizegrowers generally. The returns received by the Department indicated that the growers were not at present unanimously in favour of a Maize Pool.

The duty on imported maize under the general tariff rate is 3s. per cental. Under the Tariff Agreement between South Africa and the Commonwealth, maize of South African origin is admitted into Australia at a duty of 1s. per cental. The question of increasing the duty on maize of South African origin is to be considered in connection with the new Reciprocal Tariff Agreements between that country and the Commonwealth.

The Council circulated amongst the Local Producers' Associations a statement on the maize question and the value of the crop to Queensland, and asked for an opinion on what lines the Council should act. The returns indicated a unanimous vote in favour of a higher import duty on South African maize. Representations were then made to the Tariff Board urging an increased tariff on South African maize. The Minister for Trade and Customs and the Queensland members of the Federal Parliament have been asked to give their support to the Council's request, and have promised their assistance.

POTATOES.

A supply of excellent potatoes has been secured from Western Australia. These have been distributed amongst potato growers in bags of 7 lb. for seed purposes, on the condition that such growers returned to the Council 14 lb. for each 7 lb. received.

COTTON.

The Department of Agriculture and Stock has agreed to appoint an Entomologist to investigate cotton pests.

The supply of packs for the current season's crop is also receiving the attention of the Council.

ARROWROOT.

A pool was instituted at the request of growers, and is now in operation.

POULTRY.

After fully considering the suggestion of a Poultrymen's Committee for the formation of an Egg Pool from the business viewpoint, the Council recommended the establishment of a pool.

FRUIT.

At the request of the Council, the Chief Instructor in Fruit Culture (Mr. J. M. Ward) was appointed to act as Deputy of the Director of Fruit Culture (Mr. A. H. Benson, M.R.A.C.), and to assist in supervision.

Definite action, in the interests of fruitgrowers, has been taken in respect to the following matters:—

Appointment of Deputy Director of Fruit Culture (Mr. J. M. Ward).

Establishment and development of experimental plots in suitable localities.

Hail insurance.

Increase of entomological staff.

Legislation standardising sprays.

Co-operation with the New South Wales Government respecting border breeding grounds for fruit fly and eradication of the pest.

Establishment of a Stanthorpe and District Research Fellowship at the Queensland University, with the primary object of discovering economical means of combating the fruit fly pest.

Appointment of an entomologist (Mr. Hubert Jarvis) to specialise on the fruit fly problem.

[The appointment of an Entomologist (Mr. John L. Froggatt, B.Sc.) to investigate the Banana Beetle Borer Pest had previously been made by the Department of Agriculture.]

Special entomological investigation of the Banana Bunchy Top Disease and the Citrus Orange Bug.

To cope with the recommendations of the Council, the Entomological Staff and Fruit Inspectorial Staff have been largely increased.

Engagement of competent seasonal instructors in picking, grading, and packing.

Legislation for compulsory grading.

Amendment of the Fruit Cases Act.

Arrangements for supply of suitable case timber.

Experiments and inquiry relative to the utilisation of surplus fruits, and manufacture of by-products.

Consultation with Federal Authorities in respect to standard sizes of fruit containers.

Improvement of railway transport facilities.

Expedition of Queensland fruit consignments by rail and sea to Southern and Western markets.

Collection of reliable statistics.

Institution of the Tomato Pool at Stanthorpe at the request of growers.

Investigation and testing of systems of storage.

The carrying out of publicity campaigns which led largely to increased consumption of fruit.

Preliminaries towards more efficient marketing and distribution organisation.

THE SUGAR INDUSTRY.

Government and Council action in relation to the sugar industry has already been fully covered by the Journal, and a complete report of the proceedings of the delegation to Melbourne is set out elsewhere in this issue.

FERTILISERS.

The question of the supply, prices, and standard grades of fertilisers is under consideration in all its bearings. Official information on the elements of chemistry for the farm, dairy, and household has been disseminated by the Department of Agriculture and Stock.

WATER SUPPLY.

Water supply schemes have been prepared.

POOLS.

Legislation governing the formation of pools for farm produce.

SOLDIER SETTLEMENTS.

As the result of representations made by the Council, the Government came to the assistance of the soldier settlers at Pikedale, and agreed to make available to them amounts of £20 per acre to enable them to clear their blocks to the extent of 10 acres.

RURAL CREDIT SYSTEM.

A comprehensive scheme for the establishment of a rural credit system has been evolved, and is now receiving the consideration of a special committee of the Council.

CO-OPERATIVE COMPANIES.

The introduction of legislation to deal with the formation and activities of co-operative companies has been under consideration, and a scheme in this connection has also been evolved. This is now under consideration by the Administrative Committee of the Council.

TAXATION OF FODDER.

The Council has given consideration to the matter of the taxation of fodder, and, in view of its efforts to encourage conservation, has passed and conveyed to the proper authorities the following resolution:—

“That in view of the particulars regarding the taxation of fodder furnished in recent letters from several branches of the Queensland Producers' Association, and moreover, as the Council is now actively engaged in urging farmers to conserve fodder, it is recommended to the State and Federal Income Tax Commissioners that where fodder is stacked on a farm it be not subject to income tax until it has either been sold or converted into cash through feeding to stock.”

CONCLUSION.

The Queensland Primary Producers' Organisation scheme is probably one of the finest that has ever been brought into being in any country for the betterment of the man on the land, and it is gratifying to know that the farmers are so generally realising its potentialities and their responsibilities. The power for good of this organisation is limited only by the extent to which the producers of Queensland are willing to support and make use of it, and the extent to which they are prepared in the due spirit of co-operation to help each other by means of the scheme.

Science Notes.

By EDMUND JARVIS, Entomologist, Bureau of Sugar Experiment Stations.

ON THE HABITS AND COLOURATION OF QUEENSLAND RUTELLIDÆ.

The beetles figured on the accompanying plate include two or three of our most beautiful species of *Coleoptera*.

My feelings of admiration for the so-called “gold-beetle” (Fig. 3) were first awakened about thirty-two years ago, in Victoria, by Mr. Charles French, F.L.S., who showed me a fine series of fifty or more pinned specimens.

This insect has a very artificial appearance, seeming, at first glance, to be made literally of polished metal.

It was, perhaps, just such a beetle that Edgar Allan Poe had in mind when penning that familiar tale of mystery entitled, “The Gold Bug.”

A closely related, but slightly larger cockchafer (*A. mastersi* MacL.), of a lovely metallic greenish-gold colour is considered by growers at Macknade and Ingham to be a pest of sugar-cane.

The grubs of *Anoplognathus frenchi*, however, subsist on the roots of various native plants, but although of little or no economic interest at present may possibly be found, later on, to attack cane in those localities where the insect is known to occur freely.

The beetles are reported to feed on the foliage of a wild *Hibiscus* with large yellow flowers, that usually grows in wet situations, and is a common tree close to Cairns and at Freshwater.

In the Herbert River district it is called “Cotton-tree,” and said to be a favourite food-plant of our grey-back beetle.

It may interest readers to know that the bright colours of Rutellidæ and of many other coleoptera possessing brilliant shades of blue, green, violet, &c., are due in part to the surface of the elytra or wing-cases being formed of innumerable microscopical concavities or wrinkles. In *A. punctulatus* and *smuragdinus* (figs. 4 and 6) each of these countless punctures is surrounded by striæ, and forms the centre of a four to six-sided figure.

In the case of *frenchi* the colour appears to be of a chemico-physical nature, being due to diffraction of the rays of light falling on such surface irregularities, combined with an underlying reflecting pigment. Thus, if a specimen be left for a month or two in alcohol or formalin this pigment is destroyed, the beetle becoming of a uniform light-brown colour; whereas, if killed and dried without delay the golden splendour of the insect is permanently retained, owing to this underlying pigment, which is secreted by the hypodermal cells, being enclosed in air-tight sacs.

Anomala Australasiæ, Blackb. (Fig. 1).

The egg and early larval stages of this species—not hitherto published in our bulletins—were worked out by the writer during 1918-19, and are of scientific interest.

A beetle captured 28th November, and confined at once in a breeding-cage, was found when examined nine days later to have laid 18 eggs. These varied in size, so were probably deposited on different days. They hatched on 17th December (nineteen days after capture of the beetle); and a couple of months later (17th February) several third-stage grubs were found.

Other beetles caged on 5th December produced eggs six days later, which hatched on 20th December (fifteen days after capture of beetles).

By about the middle of April nearly all the grubs bred during the course of these investigations had moulted into stage three, and early in May were commencing to pupate.

Description of Egg.—Nearly spherical, smooth; milky-white, and measuring 2.25 mm. longest axis; ten eggs in a straight line, touching end to end, = 22.50 mm. These eggs are laid separately in the soil, no chamber or enlargement being made to allow for swelling.

Description of Newly Hatched Larva, before Feeding.—Dirty white, yellowish-brown towards and on anal-segment. Head, legs, and antennæ light-yellow, trophi reddish-brown. Body sprinkled with golden hairs. When inactive, assumes a doubled-up posture, ball-like in form, but is able to stretch to fullest length and crawl quickly on its venter. A day or two after hatching the body darkens to bluish-brown.

Description of First Larval Instar.—General colour bluish-grey; head pale-fulvous, width of same 2.70 mm. Length, doubled-up position, 9 mm., length fully extended, 16 mm. Legs whitish-yellow. Disposition of body hairs, very similar to stages two and three. Anal path on posterior ventral surface, distinct, and defined by short setæ.

Description of Second Larval Instar.—General colouration pale bluish-yellow, somewhat shining. Head, legs, and spiracles fulvous; mandibles and labrum castaneous, the former darker towards tips; width of head 4 mm. Peritremes very open, and with exception of first thoracic equi-sized. Body clothed with reddish-brown hairs, rather long, and sparingly distributed on thoracic and first abdominal segments. Posterior area of venter of anal segment with numerous short, recurved, scattered hairs, and exceptionally with no indication of an anal path. Length, in doubled-up position 15.50 mm. *Note.*—When lying on its side in this position the grub assumes an almost circular form. Length, when fully extended 28 mm.; widest transverse measurement 7.50 mm.

The colour of this beetle is dark bronze-green, more or less clouded in certain lights with lustrous shades of pink.

It was first recorded as being a cane pest by the writer in Bulletin No. 3 of this Experiment Station, 1916, p. 40.

Repsimus Æneus, Fabr. (Fig. 2).

The general ground colour of this beautiful beetle is chrome-green, most specimens, however, being flushed with coppery or steely-blue tints, while the reflected high lights appear a lovely pale golden-green.

It may be identified immediately by the structure of its hind legs, which are longer and noticeably thicker than the others.

The writer observed several of these insects in January, 1915, flying around a stunted eucalypt on the sides of Mount Pyramid.

One of them had been attacked and killed by a pentatomid bug (*Amyotea hamata* Walk.) which was seen resting on a gum-leaf supporting the weight of the beetle in mid air at the end of its proboscis, while engaged in sucking the juices of the victim.

According to Froggatt, these beetles are common about Sydney, where they are found clinging to low bushes.

Anoplognathus Punctulatus, Oliff., and A. Smaragdinus, Ohaus. (Figs. 4, 6).

These two insects, as seen by the plate, differ noticeably in form, and although both of a rich uniform green—an almost pure oxide of chromium—the shade of colour in *smaragdinus* is lightened with more yellow, producing a lustrous effect not present in *punctulatus*.

The pygidium, and under surface of the latter insect, including the legs, is dark coppery-brown with light greenish-gold reflections; while *smaragdinus* is green below, with lighter golden-brown legs, and its pygidium is the same colour as the elytra.

Neither of these beetles are known to be of economic importance, or have, up to the present, been recorded from canefields.

Anoplostethus Laetus, R. & J. (Figs. 7, 8, 9).

This species, which is one of our most lovely beetles, is remarkable in possessing distinct varieties, three of which are shown in figs. 7, 8, and 9.

The green specimens are reported to be about four times as plentiful as the other varieties, which usually occur in about equal proportions. Change of colour in perfectly developed insects is believed by Krukenberg to result from change of food, and can be explained by alteration of the pigment through heat and light. Such alteration, however, is generally effected gradually, so would scarcely apply in the present instance, unless on the supposition that an interval of a week or more may elapse between the appearance of early specimens and those constituting a larger and later emergence.

The colour in this species is evidently of a less enduring quality than those characterising the beetles already alluded to.

The beautiful glossy alizarin-green variety does not fade appreciably in dried specimens, whereas the red form, the colour of which in life resembles that shown in fig. 8, changes to brown-madder, and the pinkish opalescent violet variety darkens to a warm monochrome after death. In a fourth and much rarer orange-yellow variety of this beetle the colour appears to be of a still more fugitive nature.

A second species of this genus, *A. opalinus*, is recorded by Froggatt as being of a beautiful pale opaline-green colour, and peculiar to Western Australia.

“Christmas Beetle” (Anoplognathus Boisduvali, Boisd.), Fig. 5.

This insect was mentioned by the writer in 1915 (Bull. No. 3, p. 40) as occurring commonly among cane roots in both light and heavy classes of soil, but showing a preference for sandy loams.

Its favourite food-plant appears to be *Eucalyptus platyphylla*, a tree with white, smooth bark, and having, as denoted by its specific title, very broad leaves. It is not uncommon to find suckers springing from stumps of this gum-tree with leaves eight to ten inches in length and six to eight in width.

The general colouration of this beetle when alive is pale creamy-grey, with a distinct silvery lustre and faint green and pink iridescence. The silvery sheen, however, fades after death, being replaced by pink-ochraceous, as indicated in fig. 5, drawn from a dried specimen. Each elytron has about ten rows of coarse punctures, half of which are straight and clouded in places with smoky-brown, all ten rows enclosing numerous smaller brown punctures. The suture is green, while the outer edges of elytra are bordered with golden-brown. Head, prothorax, and scutellum metallic greenish-gold, finely punctulate. Pygidium bright green edged with blue. Ventral area iridescent coppery-green; thorax, legs, and anterior margins of abdominal segments more or less clothed with short white hairs. Tibiæ and tarsi purple.

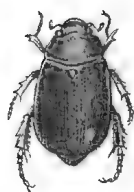
This species ranks about third in economic importance amongst our beetles attacking sugar-cane.

PLATE NO. 85.

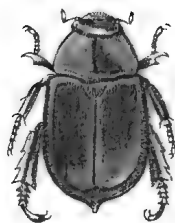
DESCRIPTION OF PLATE.

SOME NORTH QUEENSLAND RUTELLIDÆ; INCLUDING BEETLES WHICH ATTACK
SUGAR CANE (All figures life-size).

- Fig. 1. *Anomala australasiæ* Blackb.
- Fig. 2. *Repsimus æneus* Fabr.
- Fig. 3. *Anoplognathus frenchi*.
- Fig. 4. *Anoplognathus punctulatus* Oll.
- Fig. 5. *Anoplognathus boisduvali* Boisd.
- Fig. 6. *Anoplognathus smaragdinus* Ohaus.
- Figs. 7, 8, 9. *Anoplostethus latus* R. & J. (three varieties).



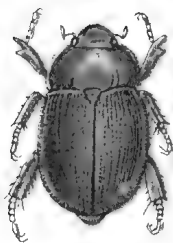
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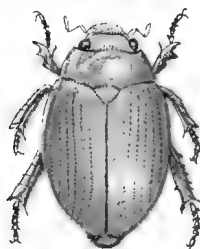
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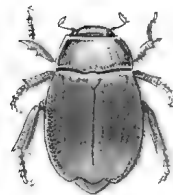
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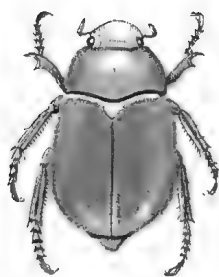
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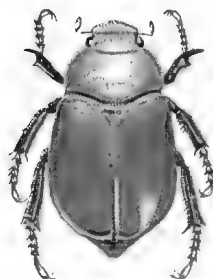
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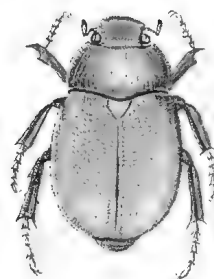
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TREATMENT FOR SMALL WORMS IN HORSES**(*SCLEROSTOMA TETRACANTHUM*).**

This is a small thread-like worm, about half an inch long, found chiefly in the large bowel in great numbers. The embryos encyst themselves beneath the mucous membrane. The countless wounds which the worms make in the bowel and the irritation caused by the encysted larvæ give rise to enteritis, &c. There is usually associated with this worm another known as the *Sclerostoma equinum*. This worm is about 1½ inch to 1½ inch long, grey or reddish-grey in colour, with a round knobbish head, and tapering to the tail end. The embryos wander into the blood vessels, causing obstructions giving rise to grave complications.

Treatment.—All suspected animals should be purged by administering a dose of physic, such as 5 to 6 drachms of Powdered Barbados Aloes with one drachm of Powdered Ginger, given as a drench in a pint of thin gruel, or made into a ball with a little soft soap. After the action of the purgative has ceased they should be given every day, about one hour before their morning feed, the following powder mixed in a couple of handfuls of damped food:—

Antimony Tartrate	..	..	..	..	..	2 drachms
Powdered Sulphate of Iron	..	..	..	..	..	1 drachm
Powdered Gentian	..	..	..	..	..	2 drachms
Powdered Aniseed	..	..	..	..	..	3 drachms

After six doses they should be given a second active purgative. For the smaller horses and ponies not more than 5 drachms of Aloes and 1 drachm Antimony Tartrate should be given. During the treatment the animals should be kept yarded to prevent the contamination of pastures by excreta, which should be gathered up and burnt and the ground dressed with common salt or quicklime. As infested animals cannot by one course of vermifuges be divested of the larvæ in the cysts and blood vessels, they should be treated at intervals of two or three months. More important than medication is the exclusion of embryos from food and water.

Wherever the *Sclerostoma* have secured a local habitat the land should be put under a rotation of crops, to be laid down in grass again after four or five years; the *Sclerostoma* ova will by this time have hatched out and died a natural death. Where this is impracticable change the horses to other pastures and depasture the infested land for several years by cattle or sheep, which do not harbour the *Sclerostoma*. In all cases it must be provided that no drainage can come from infested pastures to the clean pastures. Rock salt left in the paddocks for the horses to lick will greatly minimise the chances of infestation.—Major A. H. Cory, M.R.C.V.S.

THE COTTON BEETLE—A GROWER'S EXPERIENCE.

Mr. T. Winterton, of Lismore, New South Wales, regards the beetle that attacks the cotton plant as a minor pest, seeing that it can be easily and effectively dealt with (reports the Sydney "Daily Telegraph"). His half-acre crop looked very promising three weeks ago, when the plants were attacked by swarms of beetles. He tried dusting with lime, and arsenate of lead spray. "These," he says, "seemed to act like sauce for them, and it looked as if they would eat up everything except the stalks. I then got an old broom handle, bound a big wad of woollen cloth round the end with wire, and soaked it with kerosene. When it was dark I lighted it, and, walking slowly through the cotton, taking two rows at a time, I shook the plants. The beetles flew in myriads to the light, and fell in heaps with their wings and legs burnt. Next morning one could pick them up in handfuls in places. I went over the field again the next night, and destroyed nearly all of them. A few days after I gave them another run through, but only found one here and there, and now they are quite free. If I had known this method at the start they could all have been settled the first night, and great damage prevented. It took me about one and a-half hours to go over half an acre."

Mr. Winterton adds: It may interest your readers to know I picked some cotton to-day from plants the seed of which was planted on 6th October, or not quite four months' growing. I noticed the beetles attacked the most forward cotton first; that planted last, which was only small, was scarcely touched.

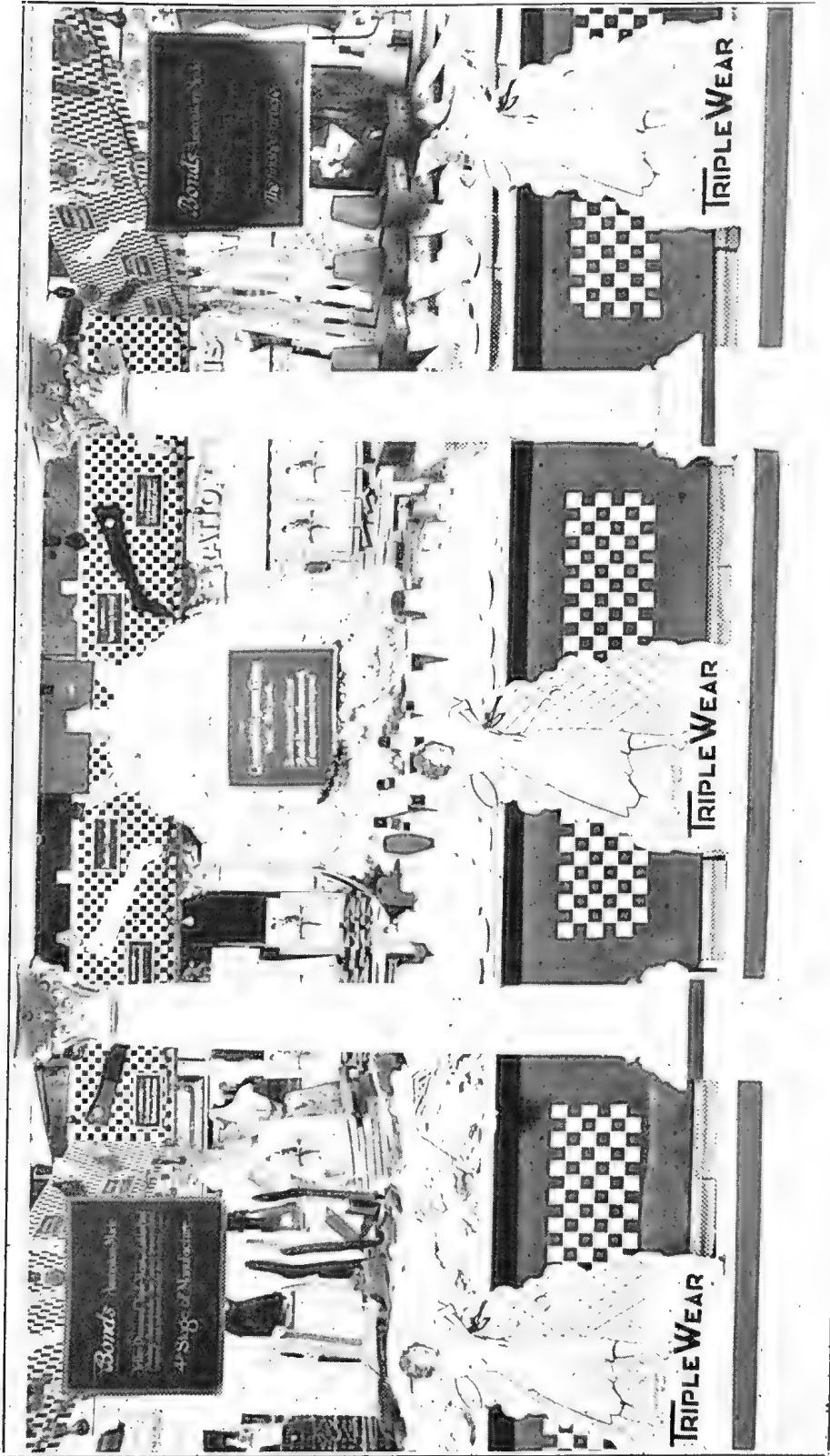


PLATE 86.—AUSTRALIAN NATIVES' ASSOCIATION EXHIBITION, MELBOURNE, 1923.

SHOW DATES FOR 1923.

Herberton, 2nd and 3rd April.	Kilcoy, 28th and 29th June.
Pittsworth, 4th April.	Ithaca, 29th and 30th June.
Chinchilla, 10th and 11th April.	Bowen, 4th and 5th July.
Goondiwindi, 10th and 11th April.	Gatton, 11th and 12th July.
Oakey, 11th and 12th April.	Charters Towers, 11th and 12th July
Toowoomba, 17th to 19th April.	Woodford, 12th and 13th July.
Kingaroy, 26th and 27th April.	Wellington Point, 14th July.
Maleny, 26th and 27th April.	Townsville, 18th and 19th July.
Miriam Vale, 26th and 27th April.	Caboolture, 19th and 20th July.
Blackall, 9th and 10th May.	Mount Gravatt, 21st July.
Boonah, 9th and 10th May.	Barcaldine, 24th and 25th July.
Taroom, 1st and 2nd May.	Nambour, 25th and 26th July.
Charleville, 1st and 2nd May.	Rosewood, 25th and 26th July.
Dalby, 2nd and 3rd May.	Maroochy, 25th and 26th July.
Nanango, 3rd and 4th May.	Pine Rivers, 27th and 28th July.
Atherton, 16th and 17th May.	Crow's Nest, 31st July and 1st
Wondai, 9th and 10th May.	August.
Roma, 15th and 16th May.	Sandgate, 3rd and 4th August.
Emerald, 16th and 17th May.	Brisbane Royal National, 6th to 11th
Murgon, 17th and 18th May.	August.
Wallumbilla, 22nd and 23rd May.	Belmont, 18th August.
Hughenden, 22nd and 23rd May.	Charters Towers, 22nd and 23rd
Ipswich, 23rd and 24th May.	August.
Kilkivan, 23rd and 24th May.	Coorparoo, 25th August.
Springure, 23rd and 24th May.	Gympie, 29th and 30th August.
Childers, 24th and 25th May.	Wynnum, 31st August and 1st
Beaudesert, 29th and 30th May.	September.
Maryborough, 29th, 30th, and 31st	Imbil, 5th and 6th September.
May, and 1st June.	Zillmere, 8th September.
Buderim, 1st and 2nd June.	Laidley, 13th and 14th September.
Bundaberg, 1st and 4th June.	Beenleigh, 20th and 21st September.
Marburg, 2nd and 4th June.	Ingham, 21st and 22nd September.
Mackay, 4th and 7th June.	Rocklea, 22nd September.
Esk, 6th and 7th June.	Toombul, 28th and 29th September.
Cairns, 6th and 7th June.	Kenilworth, 4th October.
Gin Gin, 6th to 8th June.	Esk Bushmen's Carnival, 17th and
Gladstone, 12th and 13th June.	18th October.
Gayndah, 12th and 14th June.	Nerang, 19th October.
Toogoolawah, 13th and 14th June.	Ascot, 24th October.
Mundubbera, 13th and 15th June.	Malanda, 25th and 26th October.
Mount Lareom, 15th and 16th June.	Pomona, 21st and 22nd November.
Biggenden, 20th and 21st June.	Millaa Millaa, 23rd and 24th
Rockhampton, 21st to 23rd June.	November.
Lowood, 22nd and 23rd June.	

TREATMENT FOR MANGE IN HORSES.

The affected parts should be well washed with warm water and soda. After the animal is dry, the following dressing should be applied once daily for three days:—

Sulphur	..	..	..	..	..	..	..	4 ounces
Creolin	..	..	..	..	..	..	..	4 drachms
Linseed oil	..	..	..	..	..	..	..	1 pint

Allow the dressing to remain on for three days after the last application, then thoroughly wash off and repeat dressing after an interval of a week.—Major A. H. Cory, M.R.C.V.S.



Photo. : A. Blakey, Junr.]

PLATE 87.—OVER BAROON POCKET, NEAR MONTVILLE.



Photo. : A. Blakey, Junr.]

PLATE 88.—ON THE ROAD FROM BUDERIM TO THE SEA.

General Notes.

To Correspondents.

Correspondents seeking information through the Journal should address all communications to the Under Secretary, Department of Agriculture and Stock, Brisbane. Letters on official matters should not be addressed personally to the Editor, who may be away from Headquarters on official duty at the time of their delivery. To ensure prompt acknowledgment all technical inquiries should be directed, as suggested, to the Under Secretary.

To Subscribers.

In future the cross indicating the expiry of the term covered by subscriptions will be placed in the space delineated on the first page of the Journal. It is suggested that when remitting subscriptions, former subscribers should send, say, anything up to five years' subscription (5s. to cover postage). This would simplify the work of forwarding, save time and expense of renewing stencilled mailing lists, and ensure continuity of despatch. It so often happens that when a subscriber's term expires the non-receipt of the Journal is the only reminder that his subscription is no longer current. In the meantime his name has been removed from the mailing list. When the renewal, the only evidence of a subscriber's desire to continue, is received, a fresh stencil has to be cut, and as this costs something over 1d. the expense in the aggregate is considerable. The Journal, of course, is free to farmers, and the annual charge of one shilling merely covers cost of postage.

Pools—Victorian Farmers Looking to Queensland.

A deputation of Victorian onion growers last week urged the Government to form a compulsory pool to take over the unsold balance of the crop. The growers said the cost of production was £6 per ton, including labour, and many of them were receiving only £2 5s. per ton. It was suggested that the pool should fix the selling price at £7 per ton, growers to be allowed £3 at once and £4 held in hand for expenses and reserves. The Minister for Agriculture (Victoria) said that a pool was out of the question, as it was against the policy of his Government. He advised the formation of a growers' association, and a voluntary pool. The Victorian producers are not yet educated up to the benefits of the pool system—which is merely co-operative marketing—and there is little or no recognition of the right of the man on the land to get a paying price for his products. The Queensland Butter Pool has been most bitterly attacked in Melbourne by men who were disappointed at not getting our butter at their own price, and also by honest theorists who believe that producers should muddle along in the bad old way. The dairy farmers in Victoria are asking why they have no organisation such as the Queensland farmers have, and the onion growers will have to do some hard thinking also. In Queensland the primary producers are quickly getting out of the method of throwing their stuff on to the market, and letting it take its chance, and it probably will surprise Victorians to know that produce merchants are giving very cordial support to the new system.—“The Queenslander.”

Anniversary of a Notable Agricultural Advance—A Milbong Celebration.

Messrs. S. Gordon (Secretary) and D. J. Casey (Chairman), of the Milbong Local Producers' Association, write under date 26th March:—

“To the Minister for Agriculture and Stock, Hon. W. N. Gillies.

“At a commemorative social and banquet held at Milbong on the 23rd instant, at which were represented various officials of other branches of the Producers' Association, and before a large and representative gathering of farmers, the following resolution was read and carried amidst acclamation:—

“We, farmers of Milbong and adjacent districts, meeting to celebrate the first anniversary of the birth of the Queensland Producers' Association, desire to express our gratitude to the Premier of the State and to the Minister for Agriculture for the creation of the Queensland Producers' Association, and to the Queensland Government for placing upon the statutes the Primary Producers' Organisation Act and other measures of inestimable benefit to producers.

“As evidence of our gratitude we celebrate this occasion, hoping thereby that it may stimulate a greater interest in our movement and demonstrate our appreciation of the Government's efforts to place our industry on a more remunerative plane.”

Australia as a Market for Manufactured Cotton Goods.

The export of cotton manufactures from the United Kingdom during January last amounted to 339,117,400 square yards of material, of which Australia received 22,030,300 square yards. Two other countries only exceeded that quantity, China (including Hong Kong) received thirty-five and a-half million square yards; and India (excluding Burmah) eighty-one million square yards.

Protection of Native Bears and Opossums.

A Proclamation has been issued under "*The Animals and Birds Act of 1921*," the effect of which is that there will be no open season for opossums and native bears this year.

Standing Committees; Council of Agriculture.

In accordance with the provisions of "*The Primary Producers' Organisation Act of 1922*," the following Standing Committees of the Council of Agriculture have been formed:—

Administrative.—Messrs. G. H. Pritchard, J. D. Story, E. Graham, W. Ranger, W. J. Short, J. W. Davidson, and G. Burton.

Publicity.—Messrs. G. H. Pritchard, J. D. Story, E. Graham, W. Ranger, W. J. Short, J. W. Davidson, and G. Burton. Associate Member—Mr. J. F. F. Reid.

Dairying.—Messrs. A. Evans, E. Graham, J. Hardeastle, T. F. Plunkett, R. Swan, J. T. Tatnell, and J. T. Tod.

Fruit.—Messrs. W. Biggs, T. H. Brown, W. Ranger, F. M. Ruskin, and C. Bateman.

Sugar.—Messrs. W. G. Batchler, W. Biggs, T. A. Powell, G. H. Pritchard, and W. J. Short.

Transport.—Messrs. W. G. Batchler, J. W. Davidson, A. Evans, A. McKinlay, W. Ranger, J. H. Sigley, and R. Swan.

General Agriculture.—Messrs. C. Bateman, R. K. Boyd, G. Burton, T. C. Hayes, A. McKinlay, H. C. Quodling, and J. H. Sigley.

The American Boll Weevil—Arsenic Preventive.

The National Bank of Commerce in New York, in its "Commerce Monthly," deals with the question of fighting the Mexican cotton boll weevil by the use of calcium arsenate. The paper says that 97 per cent. of the United States cotton belt is infested, and the demand for the calcium arsenate bids fair to outrun the available supply of arsenic. Further, it is said that experiments conducted by the United States Department of Agriculture and by independent agencies in recent years indicate that the most effective means of combating the weevil so far developed is the use of calcium arsenate, which is dusted upon the cotton plant at night. The dew becomes impregnated with arsenic, and the weevils are poisoned by drinking it. Calcium arsenate, it is said, was first used to poison the boll weevil in 1919, and now about 10 per cent. of the cotton acreage is treated. Because of the success of experiments so far made, a much more extensive application is planned for 1923. The amount of calcium arsenate required varies according to conditions, but 30 lb. per acre may be taken as a moderate allowance. This is distributed in a series of applications. The total cotton acreage in 1922 was 33,742,000 acres, so that if applications could be made on all fields 500,000 tons of calcium arsenate would be required, containing approximately 200,000 tons of white arsenic. Areas of marginal production in many cases would scarcely support the cost of application, while everywhere the specific used will at best fall far short of this quantity. Conditions for successful application are exacting, and in many the psychological factor of inertia must be reckoned with. But when all these deductions have been made, it is evident that there is a large potential demand for calcium arsenate to combat the boll weevil. The amount actually used will depend upon the available supply and the price in relation to the price of cotton. United States output of white arsenic, the form in which practically all primary arsenic is recovered in this country, and which is the basis for the manufacture of other compounds, increased from 3,141 tons in 1912, the year of largest pre-war output, to 11,502 tons in 1920, and production in 1922 fell only a little short of 11,000 tons. Consumption in 1920 was estimated at 14,000 to 16,000 tons, imports supplying 3,740 tons, and present demand is believed to be about 12,000 tons. While the United States is the largest producer of arsenic, it is also the largest consumer, and at no time has domestic output been sufficient to satisfy domestic requirements.



Photo. : A. Blakey, Junr.]

PLATE 89.—ON THE ROAD TO THE SEA FROM BUDERIM MOUNTAIN.



Photo. : A. Blakey, Junr.]

PLATE 90.—A MONTVILLE ORCHARD.

American Cotton Conditions.

Information received from America by Mr. W. G. Wells (Cotton Adviser, Department of Agriculture and Stock) goes to show that there is a wide range of opinion among traders and crop experts in that country as to the immediate course of prices for cotton, but the latter group have indicated a firm belief in higher figures being ultimately obtained. Crop prospects in the south of America, it is stated, were not growing any brighter, and it was more than doubtful whether the cotton States would be able, in 1923, to expand their output. A labour supply inadequate to cultivate the acreage which planters hope to sow with cotton this year seems inevitable. There had been a lack of rain in some parts where it was badly needed, and in certain localities the winter weather has been such as to make the boll weevil an even greater menace than in the past. This danger had been augmented by the shortage of efficacious insecticides. It was regarded as significant that English spinners were buying cotton from the United States as fast as they could accumulate the raw staple at present prices. This policy was determined upon shortly after France entered the Ruhr, and the acceptance of the American terms for the payment of the British debt to the United States had confirmed the spinners in their attitude. They were taking steps to maintain themselves in the cotton cloth markets of the world throughout the coming year by providing for the future requirements as far as possible. On 1st February one of the foremost cotton experts of the southern part of America predicted a price of 35 cents per lb. of cotton (roughly 1s. 5½d.) before the new American crop came on the market at the end of their summer. He also declared that the mills would have to scurry round for raw cotton in a manner not known since 1910 in order to keep their spindles at work.

Departmental Appointments.

Constable Blake has been appointed an inspector of slaughter-houses.

D. J. Binnie, the supervisor of the Cecil Plains Soldier Settlement, has been appointed an Acting Inspector of Stock.

William Rowlands, fruit packing instructor, has been made an inspector under the Diseases in Plants Act.

To Queensland Cotton-growers.

Growers, until further advised, must rail their cotton as under:—From all stations south of Ambrose (N. C. Line), excepting stations from Lakeside westwards on the Mundubbera Branch and from Blaxland westwards on the Western Line, to Whinstanes. Cotton from North Queensland to be shipped to Brisbane; from all stations west of Blaxland on the Western Line and Branch lines to Dalby; from all stations on the Gayndah-Mundubbera Branch west of Lakeside to Gayndah; from all stations between Ambrose (N. C. Line), inclusive, and Mackay, including stations on the Central Line and Branches, but not including stations on the Dawson Valley Branch (Mount Morgan-Baralaba), to Glenmore (Rockhampton); from all stations on the Dawson Valley Branch (Mount Morgan-Baralaba), to Wowan.

Marks.—Growers should brand all packages with their full name.

Advices from Growers.—It is most important that growers, when forwarding cotton, send an advice to the ginnery to which their cotton has been consigned. If growers consign cotton and fail to advise the ginnery, payment will be delayed. Therefore, always advise the ginnery when forwarding cotton, and post the advice so that it will reach the ginnery before or at the same time as the cotton.

Ratoon Cotton.—Packages containing ratoon cotton must be branded in 2-inch letters—"Ratoon." Ratoon cotton will only be received at Rockhampton and Whinstanes Ginneries, and growers are requested to rail as under:—

From all stations south of Ambrose (N. C. Line) to Whinstanes; from all stations north of Ambrose (N. C. Line) to Rockhampton (Quay street).



Photo. : A. Blakey, Junr.]

PLATE 91.—THE COAST ROAD, BUDERIM.



Photo. : A. Blakey, Junr.]

PLATE 92.—TYPICAL NORTH COAST DAIRY LANDS, BELOW BLACKALL RANGE, NEAR MONTVILLE.

America Interested in Queensland Agricultural Organisation—The Need for Marketing Machinery—A Minnesota View.

Mr. J. H. Hay, Deputy Commissioner, Department of Agriculture, State of Minnesota, writing from the State Capitol, Saint Paul, under date 22nd January, 1923, says:—

"I beg to acknowledge receipt of your kind favour of 14th December, also a number of bulletins and other agricultural information, under separate cover.

"All of this material is of decided value at this time. I refer to the fact that the farmers of the United States are giving serious consideration to the organisation of efficient marketing machinery through which to move their commodities to market. No little interest prevails in our State and in neighbouring States, with reference to the experiences of Australia and New Zealand in the matter of the marketing of their grain. There have been built up in our country strong organisations of middlemen who take heavy toll of the grain farmer. These organisations are exceedingly efficient, have large financial interests which support them, and have secured a tremendous hold upon the control of the marketing processes. In fact, they have exclusive control of the domestic and foreign marketing of the grains of this country. It is the purpose and determination of the farmers of the United States finally to secure control of their own marketing processes, and in addition an ample amount of finance with which to hold and move the crop to mills and export.

"I desire to express my pleasure and gratitude for the kindness you have exhibited in so promptly forwarding to me the information indicated above. We should be pleased to be placed on your mailing list for other agricultural information which your Department may issue in the future. I assure you that it will be our pleasure to reciprocate in any manner which you may indicate to us."

American Appreciation.

Mr. Hugh P. Baker, F.R.G.S., of the American Paper and Pulp Association, New York City, writes:—

"The 'Queensland Agricultural Journal' is being received regularly, and is very much appreciated. While my chief interest as a forester is in the forest situation in Queensland, yet, having been connected with several of our Agricultural Colleges in this country, I am very much interested in other matter in the Journal.

"Attached to this letter I am sending several of our recent Press Bulletins on the forest conditions in this country. Some of this matter may be of interest to you.

"If at any time we can give you information as to forest conditions in this country I wish you would feel free to come at us."

South African Farmers Seek Information on the Queensland Scheme for Complete Agricultural Organisation.

The Executive of the Transvaal Agricultural Union (Transvaalse Landbouwen Unie), Pretoria, writes:—

"A copy of your 'Agricultural Journal' for August, 1922, has fallen into our hands, and we are much interested to note from page 5 and the accompanying diagram that your agricultural industry is organising on almost similar lines to the Transvaal Agricultural Union.

"Whilst our Union, however, is entirely self-supporting, your organisation would appear to be under Government control, or at any rate support and reorganised by your Government.

"Our interest is so great that we would esteem it a great favour if you could send us the fullest particulars of your scheme:—Constitutional, propaganda, membership, finances, &c.

"Another point of interest to us is your method of handling Crop Reports.

"Then, your notes on your 'Primary Producers' Organisation Bill' and 'Agricultural Education Bill' have caught our eye, and we would be pleased to have copies of the Bills. In fact, any information or publications you can send us will be appreciated.

"We have recently started our own official organ, 'The Farmers' Gazette,' a copy of which will be sent to you regularly, and in the course of the next mail we hope to send you a photo. of our organisation diagram.

"A copy of our amended Constitution is enclosed herewith."

Mill Offals—An Alleged Anomaly.

A deputation representing the Warwick Farmers' Milling Company, was introduced to the Minister for Agriculture (Hon. W. N. Gillies) recently by Mr. F. T. Brennan, M.L.A. The deputation consisted of Messrs. Hooper and Kirkegaard, two of the Directors of the Warwick Farmers' Milling Company. The deputation explained to the Minister the existence of a certain anomaly regarding rebate on bran and pollard, and stated that the Wheat Board had not seen its way to meet them in their request. The Minister pointed out that he thought the deputation might again interview the Wheat Board, and he asked Mr. Brennan to represent him at such an interview. Messrs. Hooper and Kirkegaard agreed to the suggestion.

Council of Agriculture.

The new Council of Agriculture (as from 23rd March, 1923, to 30th June, 1924) has been constituted as follows:—Hon. W. N. Gillies, Minister for Agriculture and Stock, President; Messrs. J. W. Davidson (Commissioner for Railways), E. Graham (Director of Dairying), H. C. Quodling (Director of Agriculture), W. J. J. Short (General Manager, Bureau of Central Sugar Mills), and J. D. Story (Public Service Commissioner). Representatives of district councils of agriculture (districts as per Order in Council of 21st December, 1922): No. 1, Mr. G. H. Pritchard; No. 2, Mr. W. B. Biggs; No. 3, Mr. T. A. Powell; No. 4, Mr. A. Evans; No. 5, Mr. W. G. Batchler; No. 6, Mr. R. L. Boyd; No. 7, Mr. J. T. Tatnell; No. 8, Mr. J. H. Sigley; No. 9, Mr. T. H. Brown; No. 10, Mr. C. Bateman; No. 11, Mr. F. M. Ruskin; No. 12, Mr. T. F. Plunkett; No. 13, Mr. J. Hardeastle; No. 14, Mr. T. C. Hayes; No. 15, Mr. G. Burton; No. 16, Mr. J. T. Todd; No. 17, Mr. W. Ranger; No. 18, Mr. A. McKinlay; No. 19, Mr. R. Swan.

Answers to Correspondents.

Staggers.

G.O'S. (Ingham)—The Poultry Instructor, Mr. J. Beard, advises:—

It was not mentioned if the specimen were the inside of a fowl or a duck. Another omission was a description of the nature, colour, and substance of the excreta—one of our best guides to diagnosis. The age of the ducks was also omitted, but it is assumed they were young ones, and were affected with staggers. This is a common disease in this State, and is usually attributed to bad feeding, dirty water, insufficient shade, &c. In many instances, however, outbreaks of staggers occur in yards where everything is scrupulously clean, and the ducklings properly fed and cared for. It is purely an infantile complaint, and only attacks ducklings during the hot summer months. So far, there is no known cure once the ducklings become affected, they being too young for medical treatment. Staggers is a disease which breeders are alone responsible for, and which may be easily avoided if due care is paid to the breeding stock, and proper attention given to the ducklings when hatched. Another thing to avoid—never breed from muscovies under two years old.

With reference to the two Leghorn fowls, there is no data to work on.

Poultry Feeding.

J.G.T. (Mundubbera)—

The Poultry Instructor, Mr. J. Beard, advises:—Best results are obtained by feeding moist mash in mornings and grain in the evening, with green stuff of some kind at midday. There is no set rule as regards the quantity of feed a fowl will eat. They should be given as much as they will eat and no more. After a couple of weeks you will learn just what quantity they require. The mash should consist of 2 parts pollard and 1 part bran, with 2 lb. oilcake to each 100 fowls, the oilcake to be scalded overnight, given every second morning, and meat, $\frac{1}{2}$ oz. per bird each morning oilcake is not used. In lieu of meat, use 5 per cent desiccated meat, which means 5 lb. to every 100 lb. of mash; the safest way is to mix 100 mashes, add 5 lb. desiccated meat, and 22 oz. fine table salt. Mix all well together, and use as required. Evening, feed wheat, and a little maize once a week by way of a change. Always have available in a container a supply of grit, shell, and charcoal, and clean water.

Seed Cotton Sample.

A.J.B. (Toowong)—The Australian Cotton Growing Association comments on your sample as follows:—

This is a strong rather coarse lint, having a fibre length of 1.7/16 inch and being fairly even. This cotton corresponds to "Full Rough Peruvian," and there would probably be some difficulty in marketing same, as it is a speciality cotton, and not used in the manufacture of the ordinary cotton materials.

Dip Mixture—"Quinine" Plant.

H.T. (Boonah)—Mr. H. C. Quodling (Director of Agriculture) advises:—

The Department does not make a practice of commenting publicly as to the efficacy or otherwise of compounds of proprietary cattle dip mixtures. Our practice is to recommend a well-known formula for the preparation of an arsenical mixture for the destruction of timber.

The bitter bark you refer to is apparently what is known in many parts of the State as "Quinine." This is a most difficult plant to eradicate, and it is questionable whether the cutting off of the bushes close to the ground and swabbing the butts well with a poison will be efficacious, as the plants have an extensive root system, shoots from which are readily thrown out. In some localities where a heavy plough can be used it is considered more satisfactory to tear up the ground infested with the quinine roots instead of attempting to poison in the manner suggested. April and May should be the best months to poison should you decide to give this latter method a trial.

Egg Packing.

T. SEYMOUR (Hawkwood) writes:—

"The article 'Californian Methods of Poultry Raising and Marketing—I,' printed in the last issue of the Journal I read with much pleasure, and one item which I took particular notice of was that, 'The farmer buys egg-boxes holding thirty dozen from the co-operative society.' I would be pleased if you could describe that particular box in the Journal, as to the shape, size, and packing contents, or method of packing. Not only myself but many other farmers, I am sure, would be pleased to see the box described."

A description and design of an egg container suitable for the Australian trade is being prepared for the Journal, and will be published shortly.

"Ropiness" in Bread.

R.T.C. (Tarvano)—

The following extract is from Jago's "Technology of Bread Making," which the Agricultural Chemist (Mr. Brünnich) states will give you the information you require:—

Occurrence.—During hot weather bread is liable to an outbreak of the disease called "rope." Its first manifestations usually occur in from twelve to forty-eight hours after the bread leaves the oven.

Nature and Symptoms.—The bread acquires a faint sickly odour, and the crumb is infected with brownish spots, which are larger the nearer the centre of the loaf. With the progress of the disease, the spots spread and the interior of the loaf becomes moist and sticky. The infected portions may be drawn out into long threads, and hence the name of rope. With the continuation of the disease, the crumb of the bread breaks down into a molasses-like mass, and emits an exceedingly disagreeable valerian-like odour.

Susceptibility.—Breads containing bran and germ, such as whole-meal, certain patent breads, and rye bread, are all particularly susceptible. Of those made from white flour, the grades composed of the heart of the endosperm—*i.e.*, the best patent flours—are less likely to produce rope than the lower grade flours, which are more or less contaminated with dust and bran fragments.

Origin.—All modern writers agree in ascribing rope to bacterial activity.

Conclusions.—Elevated temperature appears to be absolutely necessary to the development of ropiness in bread. Even when the bacillus is present in large numbers, moisture alone, when the temperature is low, is incapable of causing its appearance.

Effects of Acidity.—In making wort cultures, it was found that the presence of 0.1 per cent. of acetic acid prevented the growth of the organism. Lactic acid has a similar effect. The author of the paper was, therefore, led to try the effect of the presence of small quantities of acid in the dough. A number of tests were made and the results recorded in which acetic acid in quantities varying from 0.3 to 1.06 lb. to the sack were used, and large amounts of wort culture added. The general result was that acetic acid in quantities of from 0.3 to 0.7 lb. to the sack inhibited the development of rope. The minimum quantity would appear to be 0.3 lb., while any excess over 0.7 lb. injuriously affected the gluten. The smaller quantity of acetic acid is not prejudicial to the general qualities of the bread. Lactic acid may be employed instead of acetic acid, but the action is somewhat uncertain with quantities below 0.6 lb. per sack.

Summary.—Ropiness in bread is produced by varieties of *B. mesentericus* (Flugge), introduced into the dough through the flour, in which it sometimes occurs in large numbers, possibly coming from the bran coatings. Breads containing bran and low-grade white flours are most prone to develop ropiness. The bacillus is a prolific spore former, the spores being capable of resisting high temperatures for prolonged periods. Once present in the dough, development of the bacillus, after bread has been made, depends partly upon the reaction of the bread, and partly upon atmospheric conditions. Bread is only faintly acid in reaction, and always insufficiently so to naturally prevent the development and spread of ropiness, but if the acidity be increased by addition of small quantities of acetic acid to the dough, development can be prevented. Low temperature and dryness of the bread store tend to suppress development, but the maximum temperature of 18 deg. C. (65 deg. F.) cannot be exceeded without great risk. When a batch of bread is found to be ropy, all flour in stock should be at once tested, so as to locate the infected stock, and in the meantime fresh supplies of flour from a different source should be laid in.

Black Spot in Tomatoes.

E.M.H. (Broomie)—

Mr. J. M. Ward, Chief Instructor in Fruit Culture, advises:—

Spray with Bordeaux Mixture, at the strength of 3.3.40—that is, 3 lb. of bluestone, 3 lb. lime, to 40 gallons of water.

Bordeaux Mixture is made by dissolving the bluestone (by using hot water will dissolve much quicker) in one gallon of water, slake the lime, and make up each to about 5 gallons of water, pouring both liquids into a third vessel, adding sufficient water to make up to 40 gallons.

The milk of lime should first be passed through cheese cloth or some other material, for the purpose of straining.

The first spray to be applied when flowering commences, and to be followed by one or two later applications.

Cotton Culture.

C.H.H.G. (Gayndah)—

The Cotton Adviser (Mr. W. G. Wells) replies:—It is suggested that the location of your cotton field in regard to the possibility of early frosts should be taken into consideration before expending any more labour on cultivation. I have not had sufficient experience in Queensland to know, nor does there seem to be any data, as to just what length of time of frost-free conditions are necessary to develop the topmost squares of a cotton plant into open mature bolls. Consequently, it is difficult to advise one as to just what percentage of the top crop of squares (small flower buds) will develop this season.

Roughly speaking, it usually takes a period of about thirty days from the appearance of the small square to the full opening of the flower, and from forty-five to sixty days from the opening of the flower to the opening of the matured boll. Under the droughty conditions of this year, the development of both the flower bud and the matured boll has been greatly hastened in some districts, many of the bolls opening far in advance of the time anticipated. It is, therefore, possible that a continuation of the present droughty conditions may cause a forced development of the top crop of squares, and resulting in an early opening of the top crop of bolls, although it is also possible that there is not sufficient moisture in the soil to fully develop the bolls formed from the late squares. You will, therefore, have to take into consideration the abovementioned points, as well as the size of the plants, before deciding whether it is advisable to expend the amount of labour sufficient to develop a good moisture retaining mulch of the surface soils.

In regard to the picking of the open cotton, I would suggest that you pay considerable attention to the grade of the picking, in order to have only one grade of cotton in each bale or whatever container you use to ship the seed cotton to the ginnery. There may be enough variation in the colour of the cotton to warrant penalising the dark coloured portions, thereby lessening the value per lb. of the whole bale of cotton, especially if any of the blackish stained "unfluffed" locks are accidentally included, so it is highly advisable not only to pick cotton free of all trash and leaves, but also free of any serious discolouration; although I might say that the slightly yellowish-tinged cotton, not the dark-brown or black, which was caused by the early March rains on the lower crop of opened bolls, may go into the regular cotton if not present to too great a degree.

The Farmers' Feathered Friends.

R.C.F. (Innisfail) writes suggesting the periodical publication of a list of protected birds, and says: "There is too much ignorance among folk who shoot their friends. Knowledge of their value as pest destroyers can only be broadcasted by the Press." Complete information on the subject will appear in the May Journal.

Farm and Garden Notes for May.

FIELD.—May is usually a busy month with the farmer—more particularly the wheatgrower, with whom the final preparation of his land prior to sowing is the one important operation. Late maturing varieties should be in the ground by the middle of the month at the latest.

Cleveland, intended primarily for feeding off, should be sown not later than the end of April.

The necessity of pickling all wheat intended for sowing purposes is again emphasised; and for general purposes, combined with economy in cost of material, the bluestone and lime solution holds its own. To those who desire an easier but somewhat more costly method of treatment, carbonate of copper at the rate of 1 oz. to the bushel and used in a dry form is suggested.

Potatoes, which in many districts are still somewhat backward, should have by this time received their final cultivation and hilling-up.

The sowing of prairie grass on scrub areas may be continued, but should be finished this month. This is an excellent winter grass, and does well in many parts of Southern Queensland.

Root crops, sowings of which were made during April, should now receive special attention in the matter of thinning out and keeping the soil surface well tilled to prevent undue evaporation of moisture.

Every effort should be made to secure sufficient supplies of fodder for stock during the winter, conserved either in the form of silage or hay.

Cotton crops are now fast approaching the final stages of harvesting. Information relative to the despatch of seed cotton for treatment is dealt with in another portion of this issue.

KITCHEN GARDEN.—Onions which have been planted in seed beds may now be transplanted. The ground should long since have been thoroughly cleaned, pulverised, and should be rolled previous to transplanting. Onions may still be sown in the open on clean and well-prepared ground. In favourable weather plant out cabbages, lettuce, leeks, beetroot, endive, &c. Sowings may also be made of all these as well as of peas, broad beans, kohlrabi, radishes, spinach, turnips, parsnips, and carrots, and, where sufficiently large enough, thinned out. Dig and prepare beds for asparagus, using plenty of well-rotted farmyard manure.

FLOWER GARDEN.—Planting and transplanting may be carried out simultaneously during this month in showery weather; the plants will thus be fully established before the early frosts set in. Camellias and gardenias may be safely transplanted, also such soft-wooded plants as verbenas, petunias, pentstemons, heliotrope, &c. Cut back and prune all trees and shrubs ready for digging. Dahlia roots should be taken up and placed in a shady situation out of doors. Plant bulbs, such as anemones, ranunculus, snowflakes, freesias, ixias, watsonias, iris, narcissus, daffodils, &c. Tulips will not suit the Queensland climate, but hyacinths may be tried, although success is doubtful. All shades and screens may now be removed to enable the plants to get the full benefit of the air. Fork in the mulching, and keep the walks free from weeds. Clip hedges and edgings.

Orchard Notes for May.

THE COAST DISTRICTS.

In these notes for the past two months the attention of citrus-growers has been called to the extreme importance of their taking every possible care in gathering, handling, packing, and marketing, as the heavy losses that frequently occur in Southern shipments can only be prevented by so treating the fruit that it is not bruised or otherwise injured. It has been pointed out that no citrus fruit in which the skin is perfect and free from injury of any kind can become specked or blue-mouldy, as the fungus causing the trouble cannot obtain an entry into any fruit in which the skin is intact. Growers are, therefore, again warned of the risk they run by sending blemished fruit South, and are urged to exercise the greatest care in the handling of their fruit. No sounder advice has been given in these notes than that dealing with the gathering, handling, grading, packing, and marketing, not only of citrus, but of all other classes of fruit.

It is equally as important to know how to dispose of fruit to the best advantage as it is to know how to grow it. To say the least, it is very bad business to go to the expense of planting and caring for an orchard until it becomes productive and then neglect to take the necessary care in the marketing of the resultant crop. Main crop lemons should be cut and cured now, instead of being allowed to remain on the tree to develop thick skins and coarseness. As soon as the fruit shows the first signs of colour or is large enough to cure down to about from $2\frac{1}{4}$ to $2\frac{1}{2}$ in. in diameter, it should be picked, care being taken to handle it very gently, as the secret of successfully curing and keeping this fruit is to see that the skin is not injured in the slightest, as even very slight injuries induce decay or specking. All citrus fruits must be sweated for at least seven days before being sent to the Southern States, as this permits of the majority of specky or fly-infested fruits being rejected. Citrus trees may be planted during this month, provided the land has been properly prepared and is in a fit state to receive them; if not, it is better to delay the planting till the land is right.

In planting, always see that the ground immediately below the base of the tree is well broken up, so that the main roots can penetrate deeply into the soil and not run on the surface. If this is done and the trees are planted so that the roots are given a downward tendency, and all roots tending to grow on or near the surface are removed, the tree will have a much better hold of the soil and, owing to the absence of purely surface roots, the land can be kept well and deeply cultivated, and be thus able to retain an adequate supply of moisture in dry periods. No not forget to prune well back when planting, or to cut away all broken roots.

All orchards, pineapple and banana plantations should be kept clean and free from all weed growth, and the soil should be well worked so as to retain moisture.

Custard apples will be coming forward in quantity, and the greatest care should be taken to see that they are properly graded and packed for the Southern markets, only one layer of one sized fruit being packed in the special cases provided for this fruit—cases which permit of the packing of fruit ranging from 4 to 6 in. in diameter in a single layer.

Slowly acting manures—such as meatworks manures—may be applied to orchards and vineyards during the month; and lime can be applied where necessary. Land intended for planting with pineapples or bananas during the coming spring can be got ready now, as, in the case of pineapples, it is a good plan to allow the land to lie fallow and sweeten for some time before planting; and, in the case of bananas, scrub fallen now gets a good chance of drying thoroughly before it is fired in spring, a good burn being thus secured.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Clean up all orchards and vineyards, destroy all weeds and rubbish likely to harbour fruit pests of any kind, and keep the surface of the soil well stirred, so as to give birds and predaceous insects every chance to destroy any fruit fly pupæ which may be harbouring in the soil. If this is done, many pests that would otherwise find shelter and thus be able to live through the winter will be exposed to both natural enemies and cold.

Further, it is a good plan to clean up the land before pruning takes place as, if delayed till the pruning has been finished, the land is apt to dry out in a droughty season.

Pruning can be started on such varieties as have shed their leaves towards the end of the month, as it is a good plan to get this work through as early in the season as possible, instead of putting it off until spring. Early-pruned trees develop their buds better than those pruned late in the season. These remarks refer to trees—not vines, as the later vines are pruned in the season the better in the Granite Belt District, as late pruned vines stand a better chance to escape injury by late spring frosts.

All worthless, badly diseased, or worn-out trees that are no longer profitable, and which are not worth working over, should be taken out now and burnt, as they are only a menace and a harbour for pests.

Land intended for planting should be got ready as soon as possible, as, if ploughed up roughly and allowed to remain exposed to the winter frosts, it will become sweetened and the trees planted in it will come away much better than if set out in raw land. In any case the land must be properly prepared, for once the trees are planted it is a difficult matter to get the whole of the land as well worked as is possible prior to planting.

Slowly acting manures—such as ground island phosphates or basic phosphates—may be applied to orchards and vineyards. They are not easily washed out of the soil, and will become slowly available and thus ready for the use of the trees or vines during their spring growth. Lime may also be applied where necessary.

This is a good time to attend to any drains—surface, cut-off, or underground. The two former should be cleaned out, and in the case of the latter all outlets should be examined to see that they are quite clear and that there is a good getaway for the drainage water. New drains may also be put in where required.

In the warmer parts citrus fruits will be ready for marketing, and lemons ready for cutting and curing. The same advice that has been given with respect to coast-grown fruit applies equally to that grown inland; and growers will find that careful handling of the fruit will pay them well. Lemons grown inland are, as a rule, of superior quality to those grown on the coast, but are apt to become too large if left too long on the trees, so it is advisable to cut and cure them as soon as they are ready. If this is done and they are properly handled, they may be kept for months, and will be equal to any that are imported.

If the weather is very dry, citrus trees may require an irrigation, but, unless the trees are showing signs of distress, it is better to depend on the cultivation of the soil to retain the necessary moisture, as the application of water now is apt to cause the fruit to become soft and puffy, so that it will not keep or carry well.

Land intended for new orchards should be got ready at once, as it is advisable to plant fairly early in the season in order that the trees may become established before the weather again becomes hot and dry. If the ground is dry at the time of planting, set the trees in the usual manner and cover the roots with a little soil; then give them a good soaking; and when the water has soaked into the soil, fill the hole with dry soil. This is much better than surface watering.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1923.	APRIL.		MAY.		JUNE.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6.3	5.49	6.20	5.19	6.37	5.2
2	6.4	5.48	6.20	5.18	6.37	5.2
3	6.4	5.47	6.21	5.17	6.38	5.2
4	6.5	5.46	6.21	5.16	6.38	5.2
5	6.5	5.45	6.22	5.15	6.39	5.1
6	6.6	5.44	5.22	5.14	6.39	5.1
7	6.6	5.43	6.23	5.13	6.40	5.1
8	6.7	5.42	6.23	5.13	6.40	5.1
9	6.7	5.41	6.24	5.12	6.41	5.1
10	6.8	5.40	6.24	5.12	6.41	5.1
11	6.8	5.39	6.25	5.11	6.41	5.1
12	6.9	5.37	6.26	5.11	6.42	5.1
13	6.9	5.36	6.26	5.10	6.42	5.1
14	6.10	5.35	6.27	5.10	6.42	5.1
15	6.10	5.34	6.27	5.9	6.42	5.2
16	6.11	5.32	6.28	5.8	6.43	5.2
17	6.11	5.31	6.29	5.8	6.43	5.2
18	6.12	5.30	6.29	5.7	6.43	5.2
19	6.12	5.29	6.30	5.7	6.43	5.2
20	6.13	5.28	5.30	5.6	6.44	5.2
21	6.14	5.27	6.31	5.6	6.44	5.2
22	6.14	5.26	6.31	5.5	6.44	5.2
23	6.15	5.25	6.32	5.5	6.44	5.3
24	6.15	5.24	6.32	5.4	6.44	5.3
25	6.16	5.23	6.33	5.4	6.45	5.3
26	6.17	5.22	6.34	5.4	6.45	5.4
27	6.17	5.21	6.34	5.3	6.45	5.4
28	6.18	5.21	6.35	5.3	6.45	5.4
29	6.18	5.20	6.35	5.3	6.45	5.5
30	6.19	5.20	6.36	5.3	6.45	5.5
31	...	...	6.36	5.2	...	...

PHASES OF THE MOON, OCCULTATIONS, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer" Time is not used.

1 April ☉ Full Moon 11 10 p.m.
 8 " ☾ Last Quarter 3 22 p.m.
 16 " ☾ New Moon 4 28 p.m.
 24 " ☾ First Quarter 3 20 p.m.

Perigee on 2nd at 7.24 a.m., and 30th at 6.24 p.m.

The Full Moon will be apparently very near to Saturn and Spica on the nights of April 1 and 2.

On the 19th the Moon in Crescent form will pass Mars soon after Sunset.

On Sunday, 29th April, an interesting Occultation of Saturn will take place about 5 p.m., Saturn reappearing about 6 p.m. Saturn will also be Occulted on 26th May, about Midnight.

1 May ☉ Full Moon 7 30 a.m.
 8 " ☾ Last Quarter 4 18 a.m.
 16 " ☾ New Moon 8 38 a.m.
 24 " ☾ First Quarter 12 25 p.m.
 30 " ☉ Full Moon 3 7 p.m.

Apogee on the 13th, at 2.48 p.m.

Perigee on the 29th, at 1.48 a.m.

Jupiter will be in opposition to the Sun at Midnight on the 5th, when it will be nearly overhead.

Mercury being at its greatest eastern elongation about the 5th should be visible between the Pleiades and Hyades soon after Sunset.

6 June ☾ Last Quarter 7 19 p.m.
 14 " ☾ New Moon 10 42 p.m.
 22 " ☾ First Quarter 6 46 a.m.
 28 " ☉ Full Moon 11 4 p.m.

Apogee on the 10th, at 4.30 a.m.

Perigee on the 25th, at 11.30 p.m.

About an hour before Sunrise on the 12th the Moon in Crescent form and the beautiful planet Venus will afford a fine celestial picture somewhat low down in the East with the Pleiades north of them.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

VOL. XIX.

MAY, 1923.

PART 5.

Event and Comment.

The Current Issue.

Among the more important features this month is a continuation of notes on the organisation of the agricultural industry, in the course of which the principles and practice of co-operation are lucidly discussed. Some very valuable tables of soil and other chemical analyses are included in a continuation of a summary of experiments carried out by the Bureau of Sugar Experiment Stations. Notes on picking, grading, and packing of fruits form another notable contribution. The notes are profusely illustrated and will be issued later in bulletin form. What has been described as the Jensenian theory of sunspots and their climatic relationship is covered in a very interesting article. Illustrations and other usual features are well maintained and in all respects the May Journal is a very informative number.

Co-operative Marketing.

As has been indicated directly or impliedly in the course of notes on the organisation of the agricultural industry in this and preceding issues, and presented lucidly and attractively from first-hand information and experience in California, where co-operative marketing has been developed to a high degree of efficiency and success, the aim of the Queensland Producers' Association should be early and effective control of the selling end of the farmer's business. The people of Queensland have awakened to the truth that agricultural prosperity spells general prosperity and more attention is being given to the fact that, as in other enterprises, business efficiency and business organisation must be applied to the marketing of primary products. The people of the cities are beginning to realise that rural problems are their problems, and that their interests are inseparable from the interests of those engaged in the State's great basic industry. Hence, any improvement on existing systems of marketing and distribution must naturally benefit both producer and consumer alike. It is felt that the co-operative principle which has proved so successful in farmers' manufacturing ventures, particularly in the dairying industry, must extend inevitably

to merchandising activities, hence the necessity of closer study of systems of co-operative marketing. In nearly every civilised country farmers are now engaged in some form of combined bargaining both in respect to their requirements and disposal of their produce. In countries like Denmark, where rural co-operative enterprises may be seen in full and vigorous working, organised co-operative marketing of farm products has been in vogue for more than half a century. In the dairying industry there more than 90 per cent. of the producers are completely and co-operatively organised, and in the live stock and other sections they are organised to the extent of over 85 per cent. In Great Britain, Ireland, the countries of Europe, Canada, and the United States of America growers have absorbed the lessons of co-operation, not only in relation to marketing, but also in respect to credits and allied problems. To all who take time off to think it seems amazing that the industry that creates so much national wealth, that takes so much out of the consumer, leaves so little for the men who primarily create that wealth. It is plainly the job of the Queensland Producers' Association to see that in this State existing anomalies and disabilities are corrected and removed and that, so far as its power extends, the real business interests of the wealth producers are adequately conserved.

Farmers are Wide Awake.

The farmers of Queensland have been stung into action and now realise fully the necessity of a proper knowledge and handling of the manifold problems peculiar to their calling. If the cityward migration of the rural population, a tendency so strongly marked in Australia, though common to all countries—a tendency calamitous from a national point of view—and consequent decline in agriculture are to be checked effectively, it can only be done by making agriculture both attractive and profitable. If enlightened country youths are denied ordinary prospects, advantages, wholesome recreation, amenities and opportunities of social and business life, then they are not likely to stay on the farm. Make agriculture profitable and a long way will have been gone towards solving that and many more of our present problems. Farmers with a knowledge of their power and driving force as an organised body demand, naturally, a fair return on invested capital and energy. Of the objects now in view, and with the means of attainment now available, the establishment and extension of co-operative enterprises are among the most important. Hitherto farmers have been content to co-operate up to the railway truck, but now they demand an effective voice in the marketing of their products. They aim to regulate the selling end of their business—regulation that will ensure security and other benefits that naturally accrue from stabilised industry. California provides an outstanding example of complete co-operation in the agricultural industry, and a study of the lines on which the system works supplies a stimulus for extending to their limit the means now in the hands of the farmers of this State through the Queensland Producers' Association.

The Queensland University and Agriculture.

In the course of an address as Chancellor of the Queensland University on the occasion of the annual conferring of degrees, His Excellency the Governor (Sir Matthew Nathan) mentioned appreciatively the benefactions received under the Walter and Eliza Hall Trust, through which useful work has been done in combating the blow-fly pest so ruinous in its effects on the pastoral industry. That work still calls for heavy expenditure for its completion; and it is only one of the pressing problems confronting our rural industries. The importance of applying science to all sections of agriculture is recognised, particularly in relation to fruit and sugar. Much has been done and much remains to be done. The munificent gift by Dr. Mayne, of some hundreds of acres on the Brisbane River within easy reach of the city, will doubtlessly accelerate the establishment by the University Senate of a base for experimental and research work in connection with agriculture.

Cotton Ratoons.

Replying recently to a deputation representative of a Central District Council of Agriculture, the Premier (Hon. E. G. Theodore) said that the way was not clear to remove the restrictions on the production of cotton ratoons. It was the Lancashire

market, continued Mr. Theodore, upon which, so far as he knew, we had to depend solely. It was hoped to build up to a million acres in Queensland; for its product a large market was wanted; and the only market he knew of was that of Lancashire. The Lancashire people definitely said that they would not use ratoon cotton, and that if even only a small percentage of it was included it would depreciate the whole crop. It would be very foolish not to heed that point. Then there was the position in respect of pests to be considered. The representation made by the delegation to the Prime Minister and himself were strongly worded and very definite. This restriction was a condition under which the Commonwealth guarantee was made, and also of the Queensland Government's guarantee. Mr. Crompton Wood himself had suggested that ultimately there might be an outlet in the East for ratoon cotton. He (Mr. Theodore) understood that the Lancashire mills only bought ratoon cotton from one country—they took the whole of its crop—and the growers, who produced that crop by black labour, had to be satisfied with much smaller prices than that paid for cotton produced elsewhere. Messrs. Crompton Wood and Harold Parker, and others they represented, it must be remembered, added the Premier, were not only buyers of cotton, but they were large investors in the cotton industry here. It would be seen that they had much at stake, and when it was said on their behalf that the ratoon article would not be accepted as legal tender, then it was obvious that it must be an inferior article from their point of view. The Government policy was to bring into force legislation to provide for the proper regulation of the industry, and for its preservation and rapid expansion. That involved the prohibition of ratoon cotton and the absolute destruction of the old shrubs and debris in the fields. Before this legislation was settled the Council of Agriculture would have the opportunity of consulting with and of advising the Government as to its views on the subject.

Small Ratoon Area.

Mr. Theodore said that a definite policy must be maintained. It was noteworthy, by the way, that only 240 acres of ratoon cotton were harvested in Queensland this year out of the 40,000 acres under crop. He considered that the correct policy for the Government to adopt was not to agree to ratoon cotton being produced until it was proved that it was the right thing. He felt that he would be recreant to his trust if he gave the undertaking sought. There had never been any doubt as to the attitude of the delegation on the ratoon question, and that was the attitude of the Government.

The Dairy Bull.

The change in the appreciation of the influence of the bull on the milk yielding qualities of the offspring since the movement for improving the dairying qualities of milking breeds began twenty-five years ago is agreeably significant. In a cutting from the London "Times" (5th March, 1923), sent to us by the Agent-General (Hon. J. A. Fihelly), it is noted that the discovery of the real value of the bull in a dairy herd has been of great importance to farmers and breeders in the Old Country, where the art of breeding and feeding has developed to a high point. It has cheapened and expedited the process of grading up the milking records of herds where the knowledge has been wisely applied. The purchase of a bull at a three and even four-figure price may savour of extravagance in pursuit of some wild notion, but experience has given a generous measure of justification for such liberality. If the calculation errs, it is usually the animal rather than the price that is at fault. After all, a high price for a bull entails a smaller total outlay than the purchase of many costly cows or heifers. The influence of the latter is not to be despised by any means; but results have shown that astonishing improvement can be effected quickly, and, in a broad sense, inexpensively, through the introduction of suitable sires. This is supported by definite testimony pertaining to all breeds. In fact, the reputations of many of the best-known herds have been made through the influences of the sires used. The choice of a bull—or of a sire of any kind—is one of the most difficult duties of a stockowner. It is aggravated by the fact that the sire is as impressive in transmitting undesirable influences as he is in giving the qualities that the breeder wishes to cultivate. An error in introducing a sire may be very costly, hence the importance of systematic and minute study of lineage and individual records.

ORGANISATION OF THE AGRICULTURAL INDUSTRY IN QUEENSLAND—III.

By J. D. STORY, Chairman Administrative Committee, Council of Agriculture; and
J. F. F. REID, Editor of Publications, Department of Agriculture and Stock.

In the first article of this series, published in the March Journal, the American Farm Bureau Organisation was described and compared with the plan of the Queensland Producers' Association. In the second instalment, which appeared in the April Journal, various phases of American marketing methods, relating more particularly to fruit, but capable of more or less diversified application, were discussed. This article is a continuation of the series and deals with primary producers' marketing problems and co-operation generally.—Ed.

CO-OPERATION.

Historical Sketch.

The fundamental ideas of individuals combining forces or co-operating in various ways to achieve certain objects are not by any means the product of recent years. Centuries ago the difficulties of foreign trade made it extremely important that, even in European ports, Englishmen should hold together and maintain by good conduct and a high standard of honest trading the reputation of their countrymen. It was found that one dishonest or greedy English merchant could endanger the trade in a country for all the rest, by selling inferior wares and by other bad conduct calculated to make Englishmen and their goods unpopular. Such considerations led to the formation of companies of merchants, to each of which was given the sole right of trading to a particular region, and also the power to make rules and regulations to be observed by every individual member.

At least one such company was originated as early as the 14th century and was known as the Company of Merchant Adventurers of England. Each merchant or firm of merchants included in the company traded separately and undertook separate risks, but was bound to observe the rules of the company and to pay entrance fees and other dues to its common funds. In each foreign port to which the members traded they erected what was known as a factory, which combined residential quarters for the staffs, warehouses for storing goods, and counting-houses for the sale of goods. Strict rules were imposed regarding the conduct of members and the quality, price, and quantity of goods sold.

Since the establishment of this company there have, of course, been many changes in world conditions. It is important, however, to note that with changing conditions, different types of organisations were brought into being to meet the new requirements, and that the tendency for persons to combine for given purposes is stronger to-day than ever before. At present we have various forms of associations—business partnerships; private companies; public companies; firms having provision for profit sharing; co-operative companies, associations, or societies—and in all of these there is the underlying principle of combining forces to attain specific objects which the members individually could not attain.

Mutual Help—Service versus Self.

It is recognised that individuals cannot progress beyond a certain point so long as they are prepared only to receive help from others and give nothing in return. American business men hold conventions for each class of occupation or business, and the men who attend do not merely get all the information they can; but they relate their own experiences, exchange views, discuss matters of mutual interest, and help others to solve problems that confront them. Having given freely they receive freely, and the result is that the whole of the industries of the nation are raised to a higher standard of efficiency. Such mutual help or co-operation within an industry is not, however, a cure for all ills. The man who is industrious and applies himself to his work along sound lines must fare better than the man who is indolent and indifferent; the man who is thrifty will be better off than the man who saves nothing; the man who has executive ability, who can plan, organise, and direct others, and so make his business more productive, will advance further than the man who only does what he is told.

The Relationship of Industry to State.

But each industry must be regarded as more than a collection of individuals competing for the supply of certain markets—it stands in a well-defined relationship to the State, to the consuming public, and to transport and financial systems, on which all trades and businesses depend. It has its own problems, its own questions of organisation and methods of production, its own peculiar difficulties regarding access to markets, and should have its own organisation. In that organisation all questions affecting the welfare of the industry should be discussed monthly, fortnightly, or weekly as the conditions may require. The whole experience of the industry, the knowledge of its most experienced members should be open to all members, who will then have more than their own knowledge and ability to rely on, and will be able, if they so desire, to proceed along sound lines, to make use of better methods and to reduce the chances of failure.

A Concrete Example.

As a concrete example of the need of such co-operation in the agricultural industry, it was found that in America in 1921, considerable difficulty was experienced in the marketing and distribution of farm products. Because of its inter-relationship with agriculture, the social and economic structure of the whole nation was vitally involved. This condition was the result of many complex factors brought about in a measure by the readjustments consequent upon the close of the war; but the most important reason was the unpreparedness of the American farmer to handle, through collective action, the problems which as an individual he was unable to solve or even to influence.

It is worthy of note that in California, where the horticultural industries were well organised, the producers were able in most cases to market their crops at prices in excess of the cost of production; and that these co-operative organisations of growers suffered comparatively little from the general business depression.

The Essentials of Co-operative Agricultural Organisation.

What then are the essentials of co-operative agricultural organisation? The late Mr. G. H. Powell, who was for nearly ten years General Manager of the California Fruitgrowers' Exchange, and who was regarded as a national figure in agricultural affairs, has supplied the following definition:—

“Co-operation among farmers may be defined as an enterprise in which the members form an agency through which they conduct the business for their greatest mutual advantage. To be co-operative it must be composed of farmers exclusively, and managed by them, and the benefits must be returned to them in proportion to the use or the patronage of each. That part of the capital necessary to create the agency and its facilities, which finds an expression in the management of the association through the voting of the members, should preferably be contributed by them in proportion to the use which each makes of the organisation. And it is desirable that the capital of each member should be kept progressively proportional to the individual shipments, or purchases, or other uses made of the agency as nearly as this may be done. In a co-operative agency, capital which creates the permanent investment, should be considered as a means of providing the facilities needed by the members; it must not be a fund on which a dividend is paid in excess of a fair rate of interest. Working capital may, of course, be provided in other customary ways.

“In forming a co-operative marketing association, it is fundamental that it be a proper legal entity, with sufficient powers to transact the business for which it is formed, to finance its activities, and, when necessary, to secure its obligations—thus, equally with other corporations, safeguarding the interests of its members, as well as of the institutions with which it transacts business.”

Producers' Problems can only be Solved by Producers.

The questions which affect the stability and permanently successful development of the agricultural industry can only be worked out by the producers co-operatively. They will not be solved by anyone else because no one but the producer has a primary, vital interest in production. They will not be solved by an individual producer.

The progress that has been made in every question affecting the production of Californian citrus fruits, for example, has resulted exclusively from the initiative and the co-operation of producers. Those who handle the growers' product for them sometimes follow but they cannot lead in the progress of an industry. Their interest in the problems of production is secondary.

A co-operative organisation, to be permanently successful, must be founded on economic necessity. It must be composed exclusively of growers, and it must be financed exclusively by growers. None has succeeded in which the growers and the buyer and speculator are joined together, because the interests of the two are not the same. The grower's primary interest is in the permanent prosperity of his investment; the buyer's or speculator's is primarily in the success of his immediate business transactions. Only the man who owns the land and whose investment runs into the future is willing, or is in a financial position, to make investments that safeguard the future of an industry.

Legal Right to Organise.

Farmers should have the legal right to organise, to do those things that are vital to the economical and orderly conduct of their business from the production to the consumption of their products; to act collectively in doing what the individual farmer would otherwise do for himself; to form purchasing, warehousing, distributing, or other necessary agencies; to confer amongst themselves and to acquire and disseminate information for the orderly purchasing, distributing, and marketing of their supplies or crops; to finance their undertakings and to enter into financial relationships to handle agricultural problems.

Membership.

A co-operative organisation should have an open door policy—that is, one by which every grower, who will conform to the policies of the association, who will abide by its rules and regulations, and who will assume his share of its responsibilities, may be admitted to membership. It is equally important that a member be permitted to withdraw from the organisation if he should become dissatisfied, provided his withdrawal is in accordance with the by-law or contract provisions governing withdrawals. No grower should be held permanently in a co-operative association against his wish. In the long run the benefits of a co-operative association are the only things that will hold the members together.

Membership should be confined exclusively to producers engaged in the production of the particular commodities with which the association is concerned and who actually use its facilities. Those who would contribute capital only should never be admitted, because the permanent capital should be the medium through which the members provide the facilities for the transaction of their own business. Membership carried with it a responsibility on the part of each member to maintain the association in periods of adversity—a responsibility which is not likely to be felt unless the organisation is the farmer's own institution, developed and managed by him, through his chosen representatives, to promote and safeguard his own interests.

Agreements.

An association must be held together through an agreement or contract between the organisation and each member. Such a contract gives the organisation a stability which enables it to know what it is expected to do, to enter into dependable business relationships, and to make necessary financial or other preparations essential to the conduct of its affairs. Nevertheless, contracts cannot hold a group of farmers together against their will, and do not in themselves assure the permanency of an association. The association's greatest safeguard against disruption, as well as its strongest business asset, is the development of faith amongst its members, confidence in the director and management, and a growing conviction that the best method of meeting the farmers' common problems lies in their co-operative efforts.

Objects.

The objects for which the agricultural industry may be organised have been dealt with in a general way in the two previous articles. It might be emphasised here, however, that these objects will come under two main headings:—

- (1) General questions affecting the industry which can to a great extent be dealt with by the farmers themselves in consultation and co-operation with State institutions, like the Department of Agriculture and the University, and which do not involve the raising of capital for specific purposes.
- (2) Particular questions affecting particular sections of the industry, such as the marketing and distribution of products and of obtaining supplies, which will involve business arrangements with existing distributing agencies, or the creation of co-operative agencies for the marketing of members' products and the purchase of their requirements. These co-operative enterprises would require arrangements for the subscription of capital for the working of each undertaking.

The farmers engaged in the industry will themselves be the best judges of what is required to increase production and to render the labour entailed in that production as little irksome as possible. With the help of the State institutions referred to, the association of farmers should be able to evolve schemes and methods of meeting those requirements.

The farmers, however, may not be quite so well qualified to determine the essentials of successful marketing and distribution, and it may be helpful to state a few general principles which have been laid down in America as a result of the experiences of marketing associations.

* Essentials to be Observed in the Formation of Marketing Associations.

The ultimate success of any co-operative marketing effort depends on the will of the farmer to co-operate, on a spirit of mutual confidence and trust in one another, on the development of the most adaptable forms of organisation and the most efficient management and procedure.

One cannot over-emphasise the fundamental necessity of confidence, faith, and sentiment among the members of a co-operative marketing association; nor can one overstate the need to develop and maintain mutual confidence, and to utilise every known means to keep the purposes and accomplishments of the organisation before the members and the general public.

Where possible local associations should be formed by small groups of growers who are neighbours and have confidence in one another. These neighbours should provide packing houses, warehouses, and other permanent facilities through the investment of their own capital; they should take part in the local management and be an intimate, personal part of the institutions. These local units become centres of vital influence for good in the community. They promote every activity that affects the upbuilding of country life, because the members learn to meet the problems together. Where a larger unit may be necessary, those responsible for its direction should never lose sight of the need for local participation and some degree of responsibility in the affairs of the organisation. Failure to do this and to keep the members fully informed is likely to result in a large impersonal association in which the individual member is removed from participation and responsibility in solving his local affairs. Because a large co-operative marketing organisation represents power its danger lies in the possibility of its becoming involved in political affairs, and in movements which, though worthy in themselves, have nothing to do with its primary purposes and can only lead to divided membership, factional control, and ultimate disruption.

THE CAPITAL IN A CO-OPERATIVE ORGANISATION.

The California Fruit Growers' Exchange, a central organisation which deals with general matters of administration on behalf of its District Exchanges and local associations, has no capital stock. Each year it estimates the cost *per box* of transacting its business, then levies an arbitrary assessment for the year, and at the end of each month renders a bill to each District Exchange for the number of boxes shipped during the month. It does not take the marketing cost out of the proceeds before returning them to the District Exchanges. At the end of the year, if a surplus has been accumulated, it is pro-rated to the District Exchanges on the basis of the shipments of each. The Exchange makes no profit, receives no dividends, accumulates no surplus.

When a producers' organisation requires capital for the purchase of supplies, erecting packing sheds, or for other purposes, the Exchange has worked out a plan by which the capital contribution of the stockholders is kept permanently proportionate to their shipments by the establishment of a revolving fund into which the stockholders agree to pay annually a specified amount per box on each box sold. Interest at the rate of 6 per cent. is paid on the capital so contributed, but no dividends are paid. The corporation is not formed for money-making purposes. The capital is necessary to provide the facilities through which the members transact their business, and both the benefits and capital contribution of the members are always kept proportional to the use which the member makes of his facilities. American agriculture can tell of the wrecks of all too many farmers' organisations that were formed as stock corporations, with disproportional capital contributions of the members, with no way to retain the capital within the organisation, or to keep it always proportional to the shipments of the members.

AVOIDABLE WASTE—TRADE CO-OPERATION.

The establishment of uniform grades for agricultural produce is one of the most important questions affecting American agriculture. It is equally important to the producer, the trade, and the consumer. The waste that occurs in badly-

handled, ungraded farm products is one of the leading causes of the high cost of distribution, because this waste must either be deducted from the farmer's price or added to the cost of distribution. It is important to the wholesale trade because the merchant cannot sell at low, gross margins unless foodstuffs are uniform and dependable in grade and quality. It is equally necessary to have an equitable, dependable supply of a good product in the hands of the retail merchant, if he is to add only reasonable margins in the sale of his products.

In the California citrus fruit industry, for example, the former average loss of one and one-half million dollars annually, caused by decay due to bad handling by the individual grower, has been practically eliminated by standardised association methods of harvesting and packing. The cost of distributing the fruit from the producer to the wholesale trade, exclusive of freight, has been reduced from 15 per cent. to 2½ per cent., including the cost of national advertising; while the dependable supplies furnished by the co-operative organisations have made it possible for the wholesale and retail trades to sell these commodities at gross margins not much in excess of those added in the case of non-perishable foodstuffs.

The California Fruit Growers' Exchange has proved that it is difficult for any fruit centre to become known in the markets of the country, and especially to the great consuming public, unless the fruit is handled, graded, and packed under standard rules and regulations, and sold under an association trade mark brand, each local unit retaining its own local brand in addition to the trade mark to identify the quality of the fruit of any district. To supply the quality required by customers the dealer buys on the known quality of the local brand, while the consumer buys on the advertised trade mark of the general association. The trade mark is the guarantee of the association to the consumer and the public. It represents a minimum standard grade, with various grades above the minimum representing the quality of fruit of each community.

An unadvertised local, or buyer's, brand may have been sold for years in a community and not be known to 2 per cent. of the consumers who have actually used the fruit, while a nationally advertised brand will be known to from 30 to 50 per cent. of the consumers in the same community.

Wasteful Speculation.

A co-operative organisation may be able to eliminate the unnecessary, wasteful speculation that is sometimes inherent in the purchase of farm products at the farm or local station, by selling through its own agents to the wholesale trade on arrival in the places where the products are to be consumed. This system of delivered sale, if well administered and adapted to an industry, assures a more dependable, equitable distribution; it eliminates speculation in purchase and in distribution, and it supplies the trade with the daily requirements at prices which must necessarily closely reflect the law of supply and demand.

In 1921, the delivered method of selling was one of the outstanding factors in saving some of the California horticultural industries from a collapse similar to that which occurred in other parts of the country. The production of the crop was financed by the growers' local bank. Through his organisation, the grower distributed his product throughout the country at his own risks—the banks did not have to finance a speculative buyer, thereby making it safer for them to finance the grower who produced the crop and distributed it in an organised, intelligent manner to the consuming centres. The wholesale trade bought their current requirements from the growers' agents on the arrival of the cars; the retail trade, in turn, bought their daily supplies from the wholesale dealer, thereby reducing the hazard of the banks that supplied the credit for the daily merchandising needs of the wholesale and retail trade.

AGENCIES OF DISTRIBUTION.

In every agricultural industry the crop needs to be financed, assembled, processed, packed or stored, and transported, and with or without further manufacture sold by the wholesale and retail trade to the consumer. There should be no antagonism between *essential* agencies involved, but rather a real understanding of the functions of each and a close co-operation between them. Until an industry has clearly analysed the problems, and has an accurate knowledge of financing and distributing processes, it is a mistake to assume that a remedy for the marketing difficulties lies in the elimination of one or more of the existing agencies of distribution. These agencies may have grown out of vital needs of distribution. Only after a farmers' organisation has proved that it can perform the same service more efficiently or more economically should it decide to eliminate any of the existing links in the chain of distribution. But it should co-operate with them in order that:

there may be a clear understanding of each other's problems, a supplementing of each other's efforts, and a development of the simplest and most economical methods.

There should, therefore, be the closest co-operation between a producers' organisation and the wholesale and retail trade. The latter are the distributing agents which bring the producer and consumer together, and the span can be efficiently and economically bridged only when there is a mutual understanding of each other's problems. The producer cannot deliver his fruit to the consumer without the retailer. The risk and the cost are both prohibitive.

The system of trade which gives the widest distribution must be based on uniform supplies of evenly-graded fruit, backed by national advertising. Given these conditions, the trade can then specialise on a commodity, display it prominently, advertise it locally for immediate results, and make quick turn-overs at a relatively low mark-up, thereby increasing distribution at a lower cost to the consumer, but a larger annual profit to the merchant.

Anything that can be done by the State or nation which is impossible of achievement, either by the individual farmer or his organisation, that helps them to a better understanding of their problems, that develops the factors which affect the handling, storage, and transportation of crops, that furnishes dependable information on crop production, or other information that serves as a guide to intelligent distribution and sale, and that insures the principle of a "square deal" in all business relationships, is in the interest of the producer, the trade, and the public alike. It is in the public interest that those branches of the Department of Agriculture, which furnish this basic crop-production information, as well as the regulatory branches of the department, shall be adequately supported and effectively developed.

THE NEED OF NATIONAL ADVERTISING.

Advertising to the consumer is fundamental in increasing the consumption of a rapidly increasing production. It increases the per capita consumption and develops new consumers. It widens the growers' markets and produces a consumer demand which helps the wholesaler and the retailer, who are primarily order takers. It strengthens the relations between the grower, the trade and the consumer. It makes it possible for the wholesaler and retailer to sell quickly at lower margins per turnover, and to give the consumer a product uniformly distributed at a lower cost of distribution.

A Pride and an Investment.

There has been no single factor that has strengthened the California Fruit Growers' Exchange among its members as much as its national advertising. The growers have a pride and an investment in the trade mark "Sunkist," that makes the enforcement of the grading rules comparatively easy. They have a pride in putting out a good product. They place "Sunkist" signs on their packing houses and on their groves. An association that deliberately breaks the rules quickly falls into disrepute among the other associations.

The Fundamentals.

The fundamentals that are essential to a growers' campaign of national advertising may be thus summarised. The growers must be organised on a sound permanent basis; they must have a large volume and pack their fruit under standard grades; they must provide a system of inspection to enforce the rules; they must own and control their trade mark; and they must establish a system of national distribution to the wholesale trade in order to insure evenness of distribution.

A Solid Foundation of Quality.

Every successful selling campaign must be built on the solid foundation of quality. If a product is of good quality it will pay to tell people about it. Some of those who hear will buy, and if the quality pleases them they will buy again and tell others. Co-operative advertising campaigns cannot trifle with details; the controlling motive must be the greatest good for the greatest number. If the problems do not affect all members of the industry, those members will not be deeply concerned.

The greatest difficulty in selling, however, does not always come from our competitors, but rather from the public's ignorance or lack of appreciation of the product and its uses. Often the greatest opportunity for increasing sales lies in increasing the basic market—in educating public demand.

A Supplement of Personal Salesmanship.

Co-operative advertising can assist by supplementing personal salesmanship and by making it more effective. It can correct misunderstandings; it can foster goodwill by pointing out services and policies of mutual benefit; it can educate the consumer to be a more discriminating buyer and set up trade marks for the buyer's protection; it can promote standardisation and dependability for developing incentives for uniformity in quality.

RELATION TO THE PUBLIC.

A co-operative organisation has a public interest relationship, which it must scrupulously fulfil, as well as the relationship to its members. It cannot live for itself alone.

A co-operative organisation of fruitgrowers, by illustration, should be an important factor in reducing the cost of living as well as insuring the growers a fair price for their fruit if it is to play a vital part in future social and economic life. The producer is entitled to a fair return on the cost of production, if the law of supply and demand warrants it.

Reduction of Costs Means Increased Output.

The co-operative organisation, however, should make a larger output possible by reducing the cost of production through the co-operative purchasing of supplies, by the joint use of tractors and other implements, and by co-operative pruning, fumigation, and harvesting. It should reduce the cost of packing by the more economical method of co-operatively purchasing packing-house supplies and by co-operative packing; it should reduce the cost of distribution to the wholesale trade by even distribution and national advertising, and it should help to place the wholesale and retail distribution of fruit on a merchandising rather than a speculative basis. By doing these things it reduces the distributing costs of the trade to the consumer.

Expenses of Association should not mean Restricted Production.

These are public relationships that should be inherent in the legal right of producers to organise. They are responsibilities which no co-operative organisation can safely avoid. No group of producers has the right to operate collectively if it uses its power of organisation to restrict production, to lessen or arbitrarily control the supply, to permit avoidable wastes that result from improper handling in preparing fruit for market, to speculate, to profiteer, to create any condition through the power of its organisation that is discriminatory or unfair to the public or to a competitor, or which permits a member, an officer, or an employee an advantage, a rebate, or a preference that is not open to all alike.

A large share of the cost of food is represented in the cost of selling or marketing. As a public question, this fact has a vital significance in these times of high living cost on account of the flow of population towards the cities. It gives new impetus and a new vision to the co-operative movement which, by simplifying the distributing process and reducing costs, may help to meet a present day social and economic need. Unless a producers' organisation confers a benefit on the public at large, as well as on the industry which it represents, its future as a vital part of the social and industrial fabric of the country is problematical; and the progress of co-operation will be measured by its ability to meet such problems.

[NOTE.—For much of the Californian information contained herein the writers are indebted to the late Mr. G. H. Powell and the officials of the California Fruit Growers' Exchange.—Ed.]

CONCLUSIONS.

A review of the principles laid down by American leaders of co-operative enterprise suggests—

I. That the Queensland Producers' Association, as the State Organisation of Queensland primary producers, should be representative of the whole of the agricultural industry.

II. That its members must conform to the policy which is determined by the majority, and which is calculated to be of the greatest good for the greatest number. They must be loyal to the Association; they must be unselfish and willing to assist each other; they must make available for the benefit of the industry the information they have collected and the results of their experience; and they must each take a personal and keen interest in the business of the Association.

III. That problems relating to the whole industry must be considered by the whole Association, and there must be equitable contribution of funds required to meet expenditure necessary for the conduct of the general business.

IV. That problems relating to particular sections of the industry or to specific districts must be considered by sectional bodies representative of those sections or districts. If capital is required for the benefit of particular sections or districts, or to establish local trading societies or other forms of co-operative enterprise, that capital must be contributed by the members concerned in the proportion in which they will participate in the benefits or use the facilities provided. Any such sectional bodies or societies must be linked up with the main Association, and the whole strength of the Association must be available, if necessary, to back up the actions of each or any section.

V. That the Association and every section of it must be willing and ready to co-operate with existing associations and agencies, with the Agricultural Department and the University, and with any other institutions that are willing to co-operate in the solving of problems relating to the economical production and orderly distribution and marketing of primary products.

An Association which will work energetically and consistently on these lines will do for the agricultural industry in Queensland what no other forces can do. In due time it will provide an organisation which will know better than any individual or department what is best for the industry; it will advise the Government of the day as to necessary agricultural legislation and regulation; it will by full and free discussion educate its members in regard to its relative importance in the forces that go to make up the State; it will, by co-operation with other bodies and agencies, arrive at a correct understanding of the interdependence of industries and of the importance of having all the forces of the State perform their proper functions and of their receiving their due proportion of the State's wealth.

Such, then, are the possibilities ahead of the Queensland Producers' Association, and the Association will progress towards the fulfilment of those possibilities just so quickly as its members are ready to progress. Wide powers have been placed in the hands of Queensland producers—it is for these producers to use those powers to their full extent or to render them inoperative by neglect or indifference. A co-operative association is not a magic circle that will banish the troubles of members immediately they join; but, if the producers of Queensland will act in concert, help one another, plan and work for the common good, they will accomplish much more for the general prosperity of the industry, and for its stabilisation and extension, than they can possibly do individually—that at least has been the result of co-operation in other industries and in other countries.

THE COTTON GUARANTEE.

The Coming Cotton Planting—Further Encouragement of Growers.

In January last an announcement was made that for the year ending the 31st July, 1924, the advance to be made by the Government for seed cotton delivered at the nearest ginnery or as might be otherwise arranged would be for seed plant cotton of good quality free from disease and defects of 1½-in. staple 5½d. a lb., and for less than 1½-in. staple 4½d. a lb. The advance to be limited to areas not exceeding 50 acres.

The Minister for Agriculture (Hon. W. N. Gillies) now desires to make it clearly known to growers that the Government, owing to the drought and the consequent circumstances of the industry, has decided to make the advance for the year ending the 31st July, 1924, as follows:—

For seed plant cotton of good quality, free from disease and	
defects of 1½-in. staple	5½d. a lb.
If of lesser staple than 1½-in.	5d. a lb.

The other conditions issued in January last in relation to the advance to remain.

Thus it will be seen that growers will, owing to this decision of the Government, be in a better position to make their arrangements for the coming planting. No alteration has been made in relation to the advance for seed cotton of 1½-in. staple, and for seed cotton of lesser staple the advance has been increased by ½d. a lb. over the January conditions, and the encouragement thus given should ensure an area under cotton that will be considerably in excess of the area planted in 1922-1923 with a great increase in the harvest; if there is an improvement in the season on that of last year, that can be reasonably looked for.

COTTON CULTIVATION—A GROWER'S EXPERIENCE.

Mr. Alec. W. van Tienhoven, a cotton-grower, of Alma Creek, N.Q., writes, *inter alia*, to "The Queensland Producer":—I planted about 5 acres with cotton in the second week of September (against expert advice), which took about 80 lb. of seed, or about 16 lb. per acre. I never thinned this out (which I did last year, with no beneficial results), but I got the rows 4 ft. 6 in. apart, and kept it well cultivated. The results are that the first picking gave nine bales of (average) 386 lb. of seed cotton, ginnery weight at Wowan, which is, in regard to the dry weather, not a bad result. The second picking will, to all appearances, turn out very good. In this cotton I never found a corn-grub or any other kind of pest, which are doing so much damage to the late planted crops.

In regard to the shedding of the flowers by little bolls, I would like to state that the same happened on my well-spaced cotton of last year, and that several of my neighbours were complaining of the same trouble.

In the beginning of October I planted another lot, also about 16 lb. of seed to the acre, and no thinning out, which is now being picked and giving a fairly good return, taking the season into consideration. There are no grubs in this lot, but another lot, which I planted in the beginning of November, gave plenty of signs of grubs, and never did as good as the early planted cotton. The weather was hot and dry in November and in the beginning of December, and no doubt this has a lot to do with the grub pest. In the latter end of December and the beginning of January we had about 9 inches of rain, with the result of a splendid growth of weeds. A few months before this I got some advice in regard to cultivation implements, and with the poor start, the rain, the weeds, the grubs, and that advice just about settled my late cotton. Had I been advised to get a disc cultivator instead of the spring-tooth cultivator (a farmer wants both) I and many more farmers who had the same advice would have a better result from the late planted crops. The disc cultivator makes the weeds look pretty sick after a single trip over them, and if the cotton is hilled up with the second or third trip most of the weeds are then covered, and by that time just about settled, and the moisture left in the soil for the cotton plants. The spring-tooth is a splendid implement, but it is no good when the weeds have such a good start on the cotton as they had with the last rain.

My experience this year is that cotton planted in September and the beginning of October, in a well-prepared seed-bed, and planted at the rate of 16 lb. of seed to the acre, rows 4 ft. 6 in. apart, gives the best results. I find the picking far easier and cleaner, as there are no long branches as is the case by the well-spaced cotton, and I find also that the early planted cotton plants are not attacked by the corn-grub.

No doubt, with a better class of cotton seed and the experience the growers gain more every year we can produce a first-class article, fit to compete in the world's markets.

In the meantime I would like to read the experiments of other Queensland growers. The experiences of the Queensland cotton-growers are, in my opinion, the best advice of all.

Why not give the cotton-growers illustrated lectures of the different pests? The way it is now, no farmer knows anything about the boll-weevil, pink worm, &c., &c. We had some fine coloured pictures of the sugar pests and its enemies in the "Agricultural Journal"—why not give the same of the cotton pests?

IMPACTION PARALYSIS OF CATTLE IN QUEENSLAND.

By JOHN LEGG, B.Sc., B.V.Sc., M.R.C.V.S., Government Veterinary Surgeon, Townsville.

The term Impaction Paralysis is used to describe a disease which has been occurring for some years past in certain areas in North Queensland, and which has been responsible for considerable losses. The term is used because a study of the history of the outbreaks, together with a consideration of the symptoms and post-mortem appearances of animals dead of this disease, leads one to believe that the disease is similar to the condition known as Impaction Paralysis in Victoria. The same disease appears to be identical with the "Dry Bible" of cattle in South Australia, and the "Midland Cattle Disease" of Tasmania. The writer can find no reference to this disease in any of the departmental reports or Journals at his disposal, and it appears that the disease, up to the present time has been unrecognised, hence the reason for recording it here.

Occurrence and Distribution.

So far the disease has been found to occur on two selections outside Charters Towers, North Queensland. The size of these selections is about 17,000 and 20,000 acres, respectively. Here on these two areas mortality has been high, but the disease does not appear to be confined to these areas. Reports have been received that cattle have been dying from an unknown cause in various other localities in the Charters Towers district, and a report was recently received concerning the death of cattle on one run close to the boundary of the Townsville-Clermont stock districts. The description of the symptoms given by the owners leaves little doubt that we are dealing with the same disease.

The disease occurs at all times of the year but shows little signs of spreading. The properties now infected have probably been infected for years.

Symptoms.

Cattle of both sexes and of all ages over eighteen months are susceptible. Rarely is it seen in young cattle, and it is probably more common in cows than in steers.

The first sign of anything being amiss is shown by the animal standing apart from the others and if driven lagging behind. It walks with a sort of "paddling gait" as if the feet were tender, but does not go far. The animal soon lies down and refuses to move. If left alone it may get up after some time and graze a little, but the appetite seems to be almost entirely lost. After the animal has been sick a couple of days it goes down. It may be down three or four more days, becoming weaker and weaker until coma sets in, when the beast lies on its side and death soon eventuates.

Salivation is commonly seen in the disease, and long strings of saliva hang from the mouth. In some cases the tongue is found to be slightly protruding from the mouth, and stockowners, on noticing the tongue in this condition and the animal salivating, have frequently examined the mouth expecting to find a bone stuck there.

The temperature and respiration appear to be normal, but the faeces are very scanty.

The animal does not seem to be able to drink, this really being due to paralysis of the throat. The lips are placed in the water, but the ability to swallow appears to be absent.

If a bush-bred beast is found down it appears to be quite bright in every way but cannot rise. If disturbed it makes frantic efforts to rise, but is quite unable to do so.

The disease usually runs a course of about five or six days. It may be as short as a couple of days or run into a fortnight.

Very few cases recover. The mortality must be well over 90 per cent., and it is doubtful if some of the cases which are stated to recover are really cases of the disease at all. One selector, who estimates his losses at over 500 head in the last five years, states that he has rarely seen a case recover, though he remembers one or two.

Post-mortem Appearances.

There are very few changes noted in making a post-mortem. A "quid" of grass is usually found in the mouth, lying between the teeth and the cheek, and may be extending right into the throat. The rumen or paunch is usually filled with foodstuffs, and the intestines usually appear normal. The last few feet of intestine contains several hard, mucus-coated pellets of dung. The bladder usually is empty.

Cause of the Disease.

The above is a brief description of the disease as it is found in North Queensland, and it is now necessary to discuss the probable causes. As stated previously, the disease appears to be identical with the Impaction Paralysis of Victoria, and a similar disease in other States. It is also probably allied to the Lamziekte of South Africa. The evidence in favour of such a conclusion is based on a study of the symptoms and post-mortem appearances, and on a history of the cases. The outstanding symptoms in Queensland are absence of temperature, paralysis of the alimentary tract (intestines, stomach, &c.), as shown by the inability to swallow, and the presence of a fair amount of foodstuff in the rumen, this not being passed on because of the paralysis, and in some cases by salivation and a protrusion of the tongue. This is followed by a paralysis of the limbs. These symptoms also

characterise the disease in other States. A further comparison between the two diseases will show that in Queensland, as well as in other parts, the disease occurs mostly on poor country and where the bone-chewing habit is common among cattle.

Research work has shown that the disease in Victoria and the Lamziekte of South Africa are both caused by bacteria, and there seems to be little doubt that, if the disease is ever made the subject of bacteriological investigation in Queensland, a similar cause will be found here. The symptoms and history of the disease all point to this being likely.

The particular bacteria causing Impaction Paralysis in Victoria belong to the group which cause "meat poisoning" or botulism. They are capable of producing very powerful toxins or poisons, which, if injected into animals, cause a disease similar to the natural disease. These bacteria have been isolated from the bones of animals which have died on the run, and the bone-chewing habit accounts for the manner in which they find their way into the systems of other animals, for, as before mentioned, the bone-chewing habit is very common where the disease is found.

Such, briefly, is the probable manner in which animals become infected. It must not be supposed, however, that all animals which die of this disease have the infection in their bones and carcasses, but all should be treated with suspicion, and it is possible that bones of cattle dead from other causes or even other animals dead on the run may be sources of infection. The toxin which is produced is absorbed from the bowel and becomes fixed in certain parts of the brain. It produces paralysis of certain nerves, especially those supplying the intestinal canal, and hence we have inability to swallow and a stasis of foodstuff in the stomach. Paralysis of the limbs follows.

Treatment.

Little can be done in the way of treatment. Nearly all cases are fatal. Statements have been made that bleeding saves many lives, though this is doubtful.

Acting on the assumption that infection is possibly caused by the chewing of bones of dead cattle, an attempt was made to clean up one selection by burning all the carcasses of animals that had died. The selection was only about 16 square miles, but, although small, it was some time before the place was even partially cleaned, seeing that over 500 head of cattle had died on this selection in about five years. The place, of course, will never be properly cleared, for it is hard to find all the bones of animals dead years ago in the patches of scrub, but an owner, who had been losing two or three head regularly per week, now reports that he has lost only five head in the last four months. Suitable licks are now being supplied to the animals.

Regarding the burning of carcasses, it might also be stated here that another selector, living next door to the abovementioned selector and on similar country, has not lost one beast from this disease. The former has made it a practice for years to burn the carcasses of animals dead on the run, whereas the latter has never done so until recently advised. It is too early yet to predict success, for there may be other factors operating to minimise the mortality at present, but prospects are hopeful.

Conclusion.

(1) A hitherto unrecorded disease in cattle has existed in the Charters Towers District for some years.

(2) This disease appears to be similar in symptoms and post-mortem appearances to the Impaction Paralysis of cattle in Victoria, and to similar diseases in South Australia and in Tasmania, and South Africa.

(3) As the disease in other parts has been proved to be due to bacteria of the type which cause "meat poisoning," investigation is required to prove whether the disease has a similar cause in Queensland.

(4) Acting on the assumption that the disease is probably caused by the animals chewing bones in which the bacteria produce their poisons or toxins, a commencement has been made by burning all the carcasses and bones on the affected runs and supplying lime to the animals in troughs. It is yet too early to state whether these measures will be successful.

(5) The mortality caused by this disease has been serious in the past. One selector reckons his losses at 500 head, and another, adjoining, at least 300 head, in the past five years. This mortality has been about equal to the natural increase, while deaths are undoubtedly occurring in other parts due to the same condition. The loss of one or two head out of a herd every few days reaches alarming figures when the aggregate is compiled.

FRUIT FLY INVESTIGATIONS.

PROGRESS REPORT OF THE GOVERNMENT ENTOMOLOGIST AT STANTHORPE.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the following report of the Entomologist in charge of Fruit Fly Investigations at Stanthorpe, Mr. Hubert Jarvis, for the months of February and March, 1923.

FRUIT FLY.

Spraying Experiments.

The continuous dry weather during the month of February proved unfavourable to fruit fly development, as was shown by the very marked decrease in infestation by it throughout this period, and the latter part of January also. Although the spraying experiments have been continued, with both Malley's Arsenate of Lead, Poison Bait spray, and also with Arsenate of Soda spray, the results obtained by me have been by no means conclusive, as the apparent immunity from attack of trees sprayed has been shared also by trees unsprayed; and this, even in relation to fruits very attractive to the fruit fly, such as "Pullers Cling" peach.

Many orchardists, however, claim the very best results from the use of Malley's Arsenate of Lead Poison-bait spray, and this spray is certainly therefore well worth persevering with next season. The fruit juice used by many in place of a certain quantity of water (i.e., about 8 gallons fruit juice with 40 gallons spray) renders the bait more attractive to the fly than if this is omitted, notwithstanding this, apparently good results have, however, been obtained without the addition of fruit juice. Although careful search has been made for dead fruit flies, and for other insects, beneath trees sprayed with arsenate of lead and molasses, no insects have so far been found by me in this situation. This would seem to indicate that this mixture is more in the nature of an attractive food-bait (especially where fruit juice is added) than a fly poison. In fact, the arsenate of lead being dense and insoluble sinks to the bottom of the application, leaving droplets of sweetened fruit syrup on the leaves of sprayed trees, and these, during rain, are washed away, whereupon the deposit of arsenate of lead remaining can readily be noticed. A good method for testing the potency of this or of any other bait as a fly-poison is suggested by Illingworth in his experiments in controlling the Apple Maggot in the United States of America. In this, cheese cloth is fastened to the ground with spikes, beneath a sprayed tree, and thus any insects which succumb through its use can be easily noticed on the white surface.

It cannot yet be stated definitely just what poison to apply and how to apply it, whether in the form of a spray, or otherwise; as the work being carried out in this district in this direction is as yet in its experimental stage. It has also been noticed that the fruit of trees (Pullers Cling Peach) well sprayed with the arsenate of lead and molasses bait, have been heavily infested with fruit fly maggots.

Trap Lure Experiments.

The only lure which has met with any real success is that known as "Harvey's Lure." This lure has undoubtedly proved of use in partially controlling the fruit fly, *C. tryoni*. Unfortunately, however, this lure varies considerably in its manufacture, some samples proving much more potent than others in attracting the fruit fly. "Harvey's Lure," as sold here in Stanthorpe, will undoubtedly catch both the male and female of the Queensland fruit fly, *C. tryoni*; one week's catch at Broadwater in four glass traps resulting in 198 fruit flies and another catch at Applethorpe from three traps totalling 210 fruit flies. In this latter instance, the traps had been set for five days.

Travelling of Fruit Fly.

One experiment was made to test the efficacy of "Harvey's Lure" away from orchard trees in bush land. Three traps, after being charged with the lure, were set in a strip of uncleared land, about 70 yards wide, between two commercial orchards. The traps were about 20 yards apart, and were baited freshly with Harvey's Lure each day for four consecutive days; one fruit fly only was caught; this fly was trapped on the fourth day, and was a female specimen of *C. tryoni*. In both orchards, the fruit fly was active, on the one side in quince, and on the other in late peaches.

Throughout this uncleared strip of bushland between the two orchards, the tomato fly, *Lonchaea splendida*, was plentiful, and numbers were captured in each

trap. This experiment would seem to indicate that either the fruit fly does not travel very readily under such circumstances as these, or travels high up in the air. (This experiment will be continued.)

Eggs in Trapped Fruit Flies.

The number of eggs contained in female fruit flies trapped with Harvey's Lure varies too greatly to support the supposition that these flies are trapped prior to depositing their eggs on the fruit. It is, moreover, almost impossible with our present knowledge to state how many eggs a female fruit fly will lay, and over what period she will lay them. The life period of an adult fruit fly may be anything from one to six months, and even longer. Individuals have been kept alive by me for nine weeks, under unnatural conditions (*i.e.*, in the Laboratory), and there is no reason—in view of what is known regarding this class of insect—why a fruit fly should not live during the whole of the fruit season, and (in the case of female flies) oviposit at intervals during this period.

Activity of Fruit Fly.

The fruit fly, *C. tryoni*, was, on the 23rd March, observed to be ovipositing in late apples (*var.* Granny Smith) at Applethorpe. The fruit flies, resulting from the eggs so laid, will probably emerge about the middle of April. Several trees are being kept for experiment. The maggot-infested fruit will be allowed to fall, and the maggots enter the soil, which will then be netted in with fine gauze, or mosquito netting. A watch can thus be kept on fruit flies emerging during late autumn, or over-wintering as pupæ, if this should prove to be their habit. This will also be tried with infested fruit in the Insectary.

Experiments are also in hand to test the depth of soil through which the newly-hatched fruit flies will penetrate upwards in their efforts to reach the surface.

Seasonal Absence of Fruit Fly.

The adult fruit fly is undoubtedly absent from the Granite Belt during the winter months (*i.e.*, from May until October). The first record of the appearance of the fruit fly, *C. tryoni*, in fruit (cherries) in this district in 1922, was on 17th November. Prior to this happening, fruit flies emerged in this office on 8th November; these flies were bred from maggot-infested late Valencia oranges, imported into this district on 18th October. It seems reasonable to conclude that a large number of fruit flies were distributed by this means, at the date mentioned and even before, as oranges had probably been coming into this district for some time prior to the discovery here of their infestation. I am of the opinion that thus the fruit fly was given then a good start, so to say, at various points throughout the Granite Belt.

From more recent observations and experiments carried out, I am inclined to think—so far as the evidence yielded by them goes—that the fruit fly does not travel far (*i.e.*, long distances), and that our greatest watchfulness should be right here in our midst. We have as yet no definite knowledge of the distance, or distances, over which a fruit fly will travel, but we do know, only too well, how rapidly it will increase and multiply from a few individuals. I would, of course, hesitate to state that the fruit fly does not travel into the district by flight; but I am strongly inclined to think that our chief danger lies in its introduction by various mechanical means, such as the importation of infested fruit, from various centres, by fruit agents and by private individuals, but also by interstate passengers on the railway.

It will greatly facilitate the inquiry here if all fruit imported into this district is (as has been suggested by Mr. Tryon) subjected to a cold storage temperature for a sufficient length of time to destroy the eggs and larvæ of the fruit fly, thus obviating all danger of fruit fly introduction by this means. The importance of care and watchfulness with respect to fruit and possible fruit fly occurrence during the months of September, October, and November cannot, in my opinion, be over-estimated. A very careful inspection of every orchard in the Granite Belt area, should, particularly at this time (during the months stated) be maintained.

Packing Sheds.

A prolific source of breeding fruit fly, and one that is generally overlooked, is the "packing shed." Hundreds of maggots escape unnoticed from fruit (stored while awaiting market) and pupating in all sorts of cracks and corners, soon emerge as adult fruit flies; access by these to the orchard is generally very easily obtainable through many openings, generally present in packing sheds, and the process of its infestation goes on continuously. All fruit so stored should be shifted at least once a week, if not oftener, and all rubbish, &c., brushed up and burnt.

OTHER INJURIOUS INSECTS.

(1) Timber Borer (*Diadoxus* sp.).

Investigation into the cause of several fine ornamental trees of the Cyprus family dying at the Summit brought to light a boring insect associated with these trees, and probably (if not the primary injurious agent) aiding in the work of destruction.

This boring insect is a beetle of the family *Buprestidae*, Genus *Diadoxus*. The larva or grub is about $\frac{3}{4}$ to 1 inch in length and much flattened in shape, the first segment bearing the head and strong cutting jaws being very much broader than the remaining body-segments. The beetle is about $\frac{5}{8}$ inch to $\frac{3}{4}$ inch in length, elongated in shape. The general colour is black, broadly marked with pale yellow across the wing-cases, the under surface having a greenish tint, very noticeable when the insect is alive. The damage is done principally by the larva, which tunnels the sapwood first beneath the bark (sometimes completely girdling the tree) and finally boring a tunnel deep into the wood, in which to pupate. The mouth of the tunnel is filled with tightly-packed chewed fragments of wood through which the beetle on emerging eats its way to the open air. The native host tree of this beetle, in the Stanthorpe district, is the Black Cyprus pine (*Callitris calcarata*). This beetle has not, to my knowledge, been found attacking any orchard tree.

(2) Cabbage Moth—*Plutella cruciferarum*.

This little moth commonly known as a "cabbage fly" has this season caused serious loss to cabbage growers. The moth itself is about $\frac{3}{4}$ of an inch across the wings, and so slender in build that it is often mistaken for a fly. The moth lays its eggs on the cabbage in some crevice on the leaf, or against a leaf vein, and on hatching from the egg the tiny green caterpillar at once commences to feed on the leaf surface, soon eating a small hole in the leaf-tissue; when full fed, it spins a silken bag or cocoon of rather open texture on the leaf; within the silken shelter the caterpillar turns to a pale yellowish brown chrysalis, which, in due time, gives rise to the moth. Wherever the cabbage is grown in any part of the world, this little pest soon makes its appearance. It is a very difficult insect to control, and all recommended arsenical sprays, such as Paris Green and Arsenate of Lead, &c., have failed to really control it, nor have nicotine mixtures proved effective. Early spraying, continued at weekly intervals during the first six or seven weeks of growth, with combined spray of Arsenate of Lead and Bordeaux mixture (copper sulphate and lime) might give good results. Trapping the moths at night by means of a hurricane lamp placed in a shallow tray of water to which a small quantity of kerosene has been added is helpful, and hundreds are sometimes thus caught. Experiments with various repellent substances are being tried, but no definite results have yet been secured.

PLANT PATHOLOGY.

By no means least among the trouble affecting orchard trees and vegetables are the various diseases of a pathological nature.

"Tomato wilt" has this season caused a great amount of damage and loss to young settlers. This disease, the cause of which is unknown, is at present under investigation by the Government Pathologist and Entomologist, Mr. H. Tryon.

A fungus disease, closely related to *Armillaria*, is responsible for serious loss among peach and plum trees in various parts of the district. Specimens exhibiting this disease are being forwarded to the officer named for identification.

SUGAR: FIELD REPORTS.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report, under date 20th April, 1923, from the Entomologist at Meringa, Mr. Edmund Jarvis:—

The Lower Burdekin During March.

A trip was made this month to the above district, Ayr being reached at midday on the 14th. The Secretary of the Pest Destruction Board, Mr. W. M. Saxby, introduced me to Mr. C. R. Crofton, president of the Shire Council, Messrs. A. H. Land, W. H. Ferguson, and other prominent growers, to whom I am indebted for cordial co-operation and, in some cases, hospitality received. Owing to the interest taken in this investigation we were able to travel over a considerable tract of

country, visiting Kalamia Mill, Rita Island, Pioneer, Jarvisfield, Seaforth, and part of Maidavale. On the evening of 16th instant, by request of the association, I delivered an address in the Ayr Shire Hall on "Control of the Grey-back Cane Beetle," which was followed by general discussion regarding those cane pests causing trouble at the present time on the Burdekin, in order that growers might have an opportunity of asking any questions occurring to them in this connection.

Effect of Drought.

The long continued dry weather has very seriously affected many plantations, the stools on which, although only 3 to 5 feet high, have turned yellowish-brown, while in some canefields the plants are already dead, or else too far gone to recover. In contrast to these drought-stricken areas it is refreshing to note the numerous stands of irrigated cane, displaying varying shades of rich green, which at present (14th March) are 6 to 8 feet in height.

The water used for irrigating purposes lies quite near the surface, often from 9 to 15 ft., and is obtained by putting down "spears," viz., iron pipes, the sides of which are pierced with $\frac{1}{2}$ -in. holes at distances of a few inches apart, these being covered by an outside sheathing of wire-gauze to prevent any larger particles of soil that might otherwise clog the pipe from being sucked into it.

The water is raised by a centrifugal pump to a height corresponding with that of the highest point on the land to be irrigated, and from thence conveyed to the plantation by an overhead fluming; or, if the ground be nearly level, is simply pumped into a deep channel cut along the highest headland. Many growers are of opinion that it does not pay to grow cane on the lower Burdekin unless provision be made for irrigation during dry seasons.

Ratoon Crops.

Some growers are in favour of doing away with ratoon crops altogether, believing that heavy plant crops, when forced by irrigation, have an exhausting effect on the soil, unfitting it, in fact, for an immediate production of vigorous ratoons. Possibly the leaching of certain plant-foods on much-irrigated areas might gradually impoverish such cane land. It has been noticed, too, that grubs usually do more damage to ratoons than to plant cane. Doing away with the former would mean more frequent and uniform cultivation of the soil as a whole, which, in itself, tends to increased fertility. Again, it would afford better opportunity for combating the grub pest by means of such methods as poison-baits dropped in planting drills, collecting of the grubs, &c. Further, the percentage of grub-infestation on a plantation is generally revealed when ploughing out a crop, and thus the grower being forewarned would have ample time, if necessary, to take action for control of the pest before grubs became large enough to do damage.

However, if deciding on the other hand to grow ratoons, weakly crops could, if desired, be manured in the usual way. I cannot advocate too strongly stirring of the surface soil at short intervals during the egg and first larval stage of the beetles.

White Ants Attacking Sugar-cane.

This pest appears to be working injury second only in economic importance to that caused by the grey-back beetle.

Strictly speaking, the insect in question is a termite, of larger size, however, than any occurring in the Cairns district. It tunnels in living cane-sticks, often completely devouring the interior above ground, leaving only the rind. Even when canes are bored throughout their whole length the heart-leaves at first often manage to keep green for a time, but in final stages of injury the stick dies, and when cut open is seen to be merely a hollow pipe.

Unfortunately, this pest has established itself on land that has been under cane for twenty years, so that its presence cannot be attributed altogether to the occurrence of old tree-stumps or roots, although these might in the first instance have harboured colonies of the termites. Mr. W. Payard, of Brandon, told me he lost two-thirds of a crop of Badila through ravages of white ants on an area of 18 acres, from which he finally cut 200 tons instead of the estimated yield of 600 tons. It seems he got rid of them at one time by sprinkling around their nests a bait composed of molasses and arsenic, which proved so effective that two flour bags could easily have been filled with their dead bodies.

Mr. Payard has remarked that the so-called "Soldier Ant" (*Iridomyrmex* sp.), a very active pugnacious species which nests underground, destroys these termites, which are never found in the immediate vicinity of its communities. I was interested to observe in this connection that some termites occupying an infested cane-stick which was carried to my hotel at Ayr, were quickly discovered and attacked by a common little black ant (*Pheidole* sp.) This insect would, I feel sure, help us very materially to combat the insect in question (*Mastotermes darwiniensis* Frogg.) if introduced freely into affected canefields. This could be very simply accomplished during the flighting time of *Pheidole* in the rainy season while swarming of the winged males and females is taking place. In our own district, which is nearer the seaboard, these useful little ants have already obtained a footing in most cane areas, where they operate as a natural controlling factor against both the weevil-borer and large moth-borer of cane. Fumigation of the ground with carbon bisulphide, after clearing off and burning all affected cane, would destroy these termites in a wholesale manner, and at the same time by killing injurious soil bacteria improve the fertility of the land.

With a view to efficiently controlling this pest we are at present experimenting with poison baits, using for this purpose living specimens of white ants brought from the Burdekin.

Large Moth-borer.

Rita Island was visited on 16th instant, this being the locality where caterpillars of the borer (*Phragmatiphila truncata* Walk.) have been very much in evidence during past seasons. At the present time, however, little damage is being done, it being the early broods of this moth emerging from May to July that cause the chief damage. I was interested to learn from Mr. Cody that he had noticed caterpillars, which he believed to be those of *truncata*, boring the somewhat thick stems of "Cat-tail" grass. After a short search specimens of this grass-borer were found, but when subsequently examined proved to be those of a lepidopterous borer that does not affect sugar-cane.

As it was the wrong time of year, I was unable to obtain data regarding the possible occurrence on Rita Island of the parasite of *truncata* (*Apanteles nonagriæ*), a useful little braconid wasp which effectually controls this moth-borer in the Cairns district.

As a general rule, which quite possibly may hold good in the Lower Burdekin district, damage from large moth-borer seldom extends throughout the growing period, but gradually disappears when the cane is about half grown. Occasionally, however, the tops of mature sticks are bored, although not always in such manner as to cause dead-heart.

Cane Grubs.

These occurred in patches on some of the irrigated areas. On Mr. A. H. Land's selection, for example, several fine stools of cane were seen to be falling over from the effects of grub injury, the main feeding-roots having been severed, so that one could pull up a large stool with little or no exertion. The soil here was an almost black, sandy loam—ideal cane land I should say—and grubs unearthed by us were working at a depth of about 6 in. The average number obtained per stool was four, most of them being in the third stage. These large grubs are apparently those of the common grey-back cockchafer (*Lepidoderma albobirtum*); but, curiously enough, the disposition of the small stout bristles bordering the anal path differs very noticeably from the arrangement of these characteristic setæ on the anal segment of grubs of our grey-back of the Cairns district. Probably when reared to the beetle stage we shall find the Burdekin grey-back to be a variety of *albobirtum*, constituting, perhaps, a distinct race, which may possibly owe its origin to soil variation, environment, rainfall, and other climatic influences.

Other grubs noticed were those of the "Christmas beetle" (*Anoplognathus boisduwali* Boisd.)—termed "Gold beetle" on the Burdekin, and probably the same insect as that called "Golden beetle" by Herbert River growers—and "red-head" grubs (*Dasygnathus australis dejeani* Mael.), a cane pest of minor importance, subsisting mainly upon humus in the soil. Additional species of scarabaeidæ not yet recorded as affecting cane, occurring in this district are *Anoplognathus frenchi* and *Calloodes grayanus*, the former—which must not be confused with *Lepidiota frenchi* of our canefields—being of a uniform brilliant metallic gold colour, while *grayanus*, a much larger species, is dark lustrous green edged with a marginal band of golden brown.

Control Measures for Grubs.

The mechanical nature of the Burdekin soils, together with the dry weather conditions, often experienced in this district at a time when grubs are too small to materially injure the cane (February to April, during which months the average rainfall is 19.55 as against 44.78 in. during the same period in the Cairns district), point to the advisability of using soil fumigants as being the controlling factor most likely to prove effective. As far as we know at present, carbon bisulphide would meet all requirements. A few days after treatment, when the grubs were dead, the plantation could, if necessary, be irrigated with every certainty of securing a good crop. Experiments in hand with Para-dichlorobenzene indicate that this fumigant, if applied to the a week or so before flighting of the beetles, would very likely prove an efficient deterrent, it being highly improbable that egg-laden females would enter or lay their eggs in ground contaminated with an odour that would prove fatal to their offspring. Such treatment could be applied during October, before emergence of the beetles, this month being usually a dry one in the Ayr district (average precipitation 0.89 in.), which would allow time for the fumes of Para-dichlor. to spread freely in all directions.

Upon appearance of the beetles, which I presume generally emerge in November, this being the wettest month (average 12.26 in.), treated areas would still continue repellant, as $\frac{1}{4}$ -oz. injections of the crystals of this fumigant do not evaporate completely until five to seven weeks after application, and even after this has taken place the soil retains the odour for about three weeks longer.

Natural Enemies.

The only species noticed during my visit was a larval specimen of the "Skip-jack" beetle (*Agrypnus mastersi*), which is predaceous upon grubs in the soil, the ground being exceptionally dry, and flowers very scarce. Mr. J. McElroy, however, told me he had often observed small wasps—which from his description I took to be males of our *Campsomeris* digger wasps—flying erratically close to the surface of the soil on cane land.

The digger wasps we are hoping to introduce very shortly from Java should prove serviceable in the Burdekin district, since the host-grubs parasitised by them in Java inhabit chiefly sandy-loam soils.

Collecting the Beetles.

With regard to collecting cane-beetles, about 6,000 quarts, principally grey-backs were paid for last season at the rate of 1s. 6d. per quart. Collecting was commenced in the middle of December, finishing up about the end of February. During last season, grubs in the Kalamia Mill area alone destroyed between 5,000 to 6,000 tons of cane. The manager, Mr. A. C. Park, thinks March is the best month in which to plant; but one cannot always be sure of the weather at that time of year. Cane is planted here mostly in May, June, September, and occasionally early in October. Mr. Land has had good results from using tops of cane planted in May.

Feeding Trees.

The chief food-plants of the grey-back cockchafer are said to be Moreton Bay fig (*Ficus macrophylla*), rough-leaved fig (*Ficus opposita*), and Moreton Bay ash (*Eucalyptus tessalaris*).

Cane Disease.

Badila cane affected by a disease apparently identical with that commonly known as "Top rot" was noticed on land belonging to Messrs. Holson and Tapolium.

This trouble seems to develop chiefly during hot weather, from February to March, often after heavy rain. The percentage of damage caused by it varies very considerably (in the present instance less than 10 per cent.). In stools harbouring the disease injury is generally confined to one or two sticks, which, strangely enough, may often be observed growing side by side with healthy canes. In advanced stages of "Top rot" the central core and heart leaves die, and when pulled out the decomposing basal portion has an offensive smell.

Up to the present this malady has received little investigation. It is said to be caused by a parasitic fungus, which it is assumed gains entrance to the plant through its roots.

Conditions favourable to development of "Top rot" are supposed to be—(1) defective drainage; (2) heavy rain during the first two or three months of the year; (3) late planting, should this chance to be followed by climatic conditions conducive to the disease; and (4) planting of varieties of cane known to be susceptible to "Top rot."

The Director of the Bureau of Sugar Experiment Stations has received the following report, under date 17th April, 1923, from the Southern Field Assistant, Mr. J. C. Murray:—

Farleigh.

At the time of inspecting this area the country was very dry, although since then fair rainfalls have occurred, though not enough as yet to give the growth sufficient impetus to yield a big crop. Numbers of farmers were planting, while others were hanging back waiting for moisture. The ground was, on the whole, in fair condition, and under the circumstances most farmers could have gone ahead with planting with a probability of a fair strike.

Cane varieties doing well are Q.813, H.Q.426, M.189, Ubo, Shahjahanpur No. 10, 1900 Seedling, B.147, N.G.16. N.G.15, H.Q.426, and Q.813 are making the best showing all through. Shahjahanpur No. 10 is doing well; in fact, this variety on a piece of rich soil is showing 7 feet of cane, and farmers would be well advised to persevere with it. Shahjahanpur No. 10 does not require a rich soil, usually doing very well on a good grade forest loam. Its immunity from frost is another factor that should commend the variety to growers on low-lying soils. Farmers are advised, when they first get this cane, to plant it on their best soil until it gets used to the land, and always adopt careful plant selection. If they do this they will find planting Shahjahanpur profitable.

Growers here are advised to go in more for green manuring; also, especially on the older soils, the use of maize as a rotation crop. They are also advised to make use of existing facilities for getting soils analysed.

Netherdale.

The cane in this area looked greener probably than any other place in the Mackay district. The land, generally speaking, has only been growing cane a short time, and consequently retains much of its virgin richness. Both scrub and forest land are mostly first-class soils, although not always accessible to the plough.

Cane varieties doing well in this district are Q.855, Q.813, Q.1121, D.1135, N.G.15, H.Q.426, and Q.970. On scrub land Badila (N.G.16) is making the best showing; but on forest soils Q.970, 813, and 855 are making excellent progress. Q.855 looks particularly well, showing in some cases hardly any sign of deterioration after the long dry spell. This variety is stooling well, with cane of good length and thickness. Q.970 also on present appearances should commend itself to growers on forest soil. Q.813 is also making an excellent showing.

Farmers are recommended to try E.K. 1, E.K. 28, and Shahjahanpur No. 10, also "Pompey."

Rainfall in the Netherdale area is probably more regular than any other of the Mackay areas. Farmers are advised to green manure as much as possible, thus preventing the soil from gradually getting poorer as time goes on.

Samples were taken from typical soils in this area, and the results of their analyses will apply fairly generally. The cane is healthy and free from pests. Grub infestations are not serious. Growers are reminded that careful plant selection is a big factor towards success.

Pinnacle.

Cane on this area has been checked, but not seriously so, by the dry weather. There should be a fair crop, unless an absolute drought strikes the district until, say, the end of April. Badila is making a good showing on the Pinnacle plains, while in other places Q.813, 1900 Seedling, D.1135, Q.970, and H.Q.426 (Clark's Seedling) are looking like cheque winners. Green manuring with cowpea is being more extensively used than hitherto. Farmers are advised to use lime in connection with this operation.

Cane pests are not causing loss at present, although on this area farmers suffer occasionally from grub infestation. Intensive cultivation is a big factor in checking the maturing process of the cane grub, as this destroys the natural habitat of the pest and retards its natural development towards the adult of the species.

In common with most other cane lands in Queensland, partially sterile patches of soil are found on many of the farms. The farmers are advised to cast animal manures on to these pockets if it is available, or try the effect of lime in proportion to the size of the sterile piece of land.

Down the river towards Gargett the cane looks green, but wants rain badly. Nut grass is a considerable pest to the farmer in this locality. Samples were taken for analyses from fairly typical Gargett and Pinnacle soils.

Marian.

This district, in common with the other areas, is suffering from want of rain. Cane here is seriously checked, but as light rains are falling now with considerable promise of continuance there should be a fair crop. There is not yet any need for undue pessimism. Excellent results have been obtained from the use of lime and green manures, and farmers are strongly advised to continue these operations.

It is probable the Q.813 is standing the dry spell as well as any variety. Malagache is suffering considerably, also 1900 Seedling. None has been stricken beyond recovery. Farmers are recommended to obtain and thoroughly test "Pompey," E.K.1, and Shahjahanpur No. 10. No serious loss is being incurred through cane pests.

A most important phase of farming on these Marian lands is sub-soiling, not inversion by deep ploughing, but disturbing the subsoil as deeply as possible to increase its capillary action in dry weather. This would greatly increase the resistance of the land during drought and, incidentally, produce heavier crops.

Walkerston.

The cane on this subarea is backward owing to the dry weather. Farmers, however, are busy cultivating and otherwise preparing for a moderately early planting. Varieties making a fair showing in face of the hard conditions are H.Q.426, Q.813, 1900 Seedling, D.1135, and M.187. Of these it is probable that D.1135 is showing the greatest hardihood. Q.813 is making a fair showing, although in one field a peculiar freakish growth of the top was noticed to be occurring fairly frequently through the cane. It appears to be the result of a shoot returning to vegetative growth after it had started to develop an arrow, and the result was a bunched and twisted top. There was no evidence of root-destroying fungi or nematodes. A big factor in causing the malformation has probably been the very adverse weather conditions.

Growers here are recommended to use green manures as much as possible, as the soil is deficient in humus. The average soil reaction is acid.

Mackay.

The cane immediately round Mackay has been severely checked by the dry weather. However, it will recover if downfalls of rain are not delayed too long. Most of the available land is planted, and some months back the crops looked remarkably promising for a heavy yield. Some of the farmers are busy breaking up and planting, but numbers are waiting for the weather to break.

Varieties holding out well include Shahjahanpur No. 10, Q.970, Q.1121, 7R.428 (Pompey), D.1135, and E.K.28. Of these it is probable that the firstnamed is showing the greatest resistance to dry weather conditions. This cane is also showing a strong degree of resistance to disease. 7R.428 or "Pompey" is showing excellent qualities, especially in the ratoons. Q.970 and Q.1121 require plenty of cultivation, and if this is carried out are very satisfactory varieties for this locality. E.K.28 is showing well, and with careful cultivation and plant selection should become a staple variety.

Summarising, the great drawback is want of rain. It is many years since the cane has had such a severe time. Areas outside the Pioneer Valley were more fortunate than those within the influence of the river in respect to showers so far fallen. Going into details, and being as brief as possible, the factors growers require to bear in mind are these—

Farleigh District.—Deeper cultivation and more green manuring; introduction and careful trying of new varieties; careful plant selection; and making greater use of the facilities provided by the Bureau for soil analyses.

Netherdale District.—Green manuring; careful plant selection.

Pinnacle District.—Liming and green manuring; careful plant selection; introduction and trying of new varieties.

Marian District.—Greater use of lime and green manures and facilities provided by the Bureau of Sugar Experiment Stations for soil analyses; careful plant selection and subsoiling.

Walkerston District.—Lime and green manures; analyses of soils and plant selection.

Mackay Area.—Subsoiling and green manuring; careful plant selection.

SUNSPOTS AND THEIR RELATION TO CLIMATE.

SEASONAL FORECASTING.—POSITION IN QUEENSLAND.

By H. I. JENSEN, D.Sc., Geological Survey.

The last twelve months constitute the severest drought period Australia has experienced since 1900-1902. It is not Queensland alone which has suffered failure of wheat crops, dying stock, heavy losses of sheep and cattle, disastrous bush fires, and similar calamities, but every State in the Commonwealth has been more or less affected by drought.

The present drought commenced eighteen months ago in Europe, the provinces of the old Austrian Empire, old Russia, Transcaucasia, and Siberia being affected. The adobe soils of Samara and Odessa are like the lands of our Western downs and Maranoa, and have a similar climate. Droughts are periodic and unavoidable.

The past twelve months in England have been the driest for twenty years. The American wheat crop is deficient. The Nile has been the lowest for two decades. Drought conditions have been world-wide. Again this year there is a second famine pending in Ukraine and Southern Russia. Plague, that usually accompanies great drought, has made its appearance in Australia in spite of precautions; violent electrical storms have visited scattered places; heat waves have been experienced, and cloudbursts in isolated places near the coast. All these phenomena are a repetition of what occurred between 1899 and 1902.

Stock losses have been reduced in Australia in the past year, as compared with 1901-2, through the greater abundance of artesian bores, and through the more extensive distribution of prickly-pear, and crop losses have been somewhat lessened through more scientific methods of agriculture. But the season has been a severe one for the man on the land, especially occurring in a period of artificially low prices for primary products, and high prices for manufactured goods.

It is obvious that if we know the cause of these periodic droughts of world-wide extent, and if we can forecast them with some degree of accuracy, we can prevent a great proportion of the loss and suffering resulting from them.

Drought and Sunspots.

In June, 1904, the present writer contributed a paper to the Royal Society of New South Wales on the subject of the interrelation of seismic and climatic phenomena with solar conditions. It was shown that periods of world-wide drought were synchronous with sunspot minima.

Climatic Cycles.

Jevons, the great English political economist and statistician, showed that Indian famines coincided with sunspot minima, and wheat prices fluctuated in close relation with the inverted sunspot curve.

Meldrum has shown that the number of severe cyclones in the West Indies is much greater in sunspot maximum than in minimum years, while Blanford has shown that the atmospheric pressure is greater over India in years of sunspot minimum than maximum.

Wolf, a German meteorologist, and later Bruekner, first showed that climatic cycles brought a return of similar conditions in three sunspot periods—thirty-three to thirty-five years—the Bruekner cycle. The investigations of Hann, the great Austrian meteorologist, have confirmed this. Dr. Rudolph Mewes and Professor Foerster, of Berlin, said that rainfall is greater in sunspot maximum years owing to the more excessive evaporation. Professor Schuster wrote: "The difference between the average temperature in years of maximum of sunspots and years of minimum amounts to as much as 0.73 degrees C. in tropical, and over 0.5 degrees C. in extratropical regions." Carpenter and Balfour Stewart found that "sunspot inequalities, whether apparent or real, seemed to have nearly the same periods as terrestrial inequalities, as exhibited by the daily temperatures of Toronto and Kew." Alex. McDowall, another well-known British meteorologist, contends that rainfall in Britain varies with the sunspot curve. Spectroscope observations in India by Blanford, Roscoe, and Balfour Stewart show that the radiation of heat from the sun is greater at sunspot maxima than at minima.

The close connection between terrestrial magnetism and solar changes was shown by Ellis, in Phil. Trans. 1880. He found that the diurnal ranges of the magnetic elements of declination and horizontal force are subject to a periodic variation, the duration of which is equal to that of the eleven years sunspot period. Violent solar disturbances are reflected in violent magnetic disturbances on the earth, accompanied by auroral displays.

The Cause of Sunspots—A Probable Theory.

Sir Norman Lockyer contended that sunspots are the result of the falling in or condensation of large volumes of cool metallic vapours of the sun's atmosphere, which form the beautiful and extensive corona that is always present round the sun in minimum years. This is a probable theory. However, it is a proven fact that there is a much more vigorous circulation of the sun's atmosphere, and consequently greater evolution of heat and electrical waves, when the spots are plentiful. Therefore, more heat and energy are radiated into space. The earth and the other planets receive more heat and energy, some of which possibly transmute lead and other minerals into uranium and radium to disintegrate later under different conditions. The earth radiates less heat into space in maximum years; consequently, evaporation is greater, climates are more equable, crops are better, the atmosphere circulates more vigorously, the moisture-laden clouds are carried further inland, and precipitation of rain is more general. A mean difference of 5 degrees C. between the average atmospheric temperatures of maximum and minimum years can account for enormous evaporation and climatic difference.

Position Reviewed.

We can now see that it is no mere coincidence that the years 1811-12, 1844-46, 1864-69, 1896-1902, and 1922 were years of severe world-wide drought. These are all sunspot minimum periods. The Nile in 1902 was the lowest on record, but this year it was nearly as low. The year 1901 was exceptionally dry in Siberia, as John Foster Fraser recorded in his travels there that year ("Real Siberia," p. 148). So also were the sunspot maximum years 1864, 1870-71, 1893-96 years of wet seasons in most parts of the world. The Rothery rainfall records, the most complete in the world, show the greatest droughts to have occurred in 1822, 1855, 1887, sunspot minimum years.

Heavy rain squalls and cloudbursts occur at scattered coastal places and on oceanic islands in years of sunspot minimum. The moisture-laden clouds and the cyclonic disturbances originating over the ocean break and dissipate before the central portions of the continents are reached. Mauritius generally has the driest years when India has its wettest. Glaciers advance most in years of sunspot maximum, and retreat in sunspot minimum. Very little snow fell on Mount Kosciusko in 1902.

The Drought Question.

Red rain, fireballs, violent electrical storms, intense duststorms, and such phenomena are characteristic of sunspot minima, as are also heat waves and cold waves.

In a highly mobile fluid like the atmosphere many anomalies occur in rainfall which makes seasonal forecasting for any individual place a practical impossibility. Heavy rains occur at times in England when we are still suffering drought in Australia. But that is readily understood when one takes into consideration that England is insular, and high mountains such as those of Scotland, like the Rockies of North America and the Andes of South America, also cause cyclonic disturbances to be drawn inland even in sunspot minimum years when regions like Australia, the Deccan, South Africa, and Siberia and Russia, which have no "chimneys" to create a draught, are drought-stricken as long as the sunspot minimum lasts. It has also been noticed that droughts commence a year or so earlier in the one hemisphere than in the other, the position of the moon north or south of the equator accounting for this phenomenon.

The drought of the present year came a season earlier in Russia than in Australia. We are not done with it yet. The recent rains are very cheering, but entirely insufficient. To be forewarned is to be forearmed. A small and erratic rainfall cannot produce grass in sufficiency.

There seems to be little hope of science ever being able to achieve exact seasonal forecasts for small districts. The best that astronomy can yield is a general continental forecast giving an indication of the class of season to expect. This should, however, be a great aid to agriculturists and pastoralists.

Possibility of Forecasting Earthquakes.

Owing to the mobility of the atmosphere small causes, often produced by the acts of man, a bush fire, a clearing of virgin scrub, or something such, frequently cause an abnormal season for the environment.

Forecasting earthquakes and eruptions may become a practical possibility. Since solar influences in this case affect the earth's crust, an immobile medium, the effects can be foretold. But in the atmosphere minor causes bring about great variations.

Nor will it ever be possible by human agencies to make bad seasons good, or *vice versa*, though man may be able to modify somewhat the severity of a drought in coastal districts by explosive or electrical agencies. Wragge's Styger Vortex guns were a failure, but the experiment was worth trying; and, in view of the heavy rainfall caused by artillery cannonade on battlefields, possibly the same experiment on a larger scale in a coastal district might have brought copious rain.

Hertzian waves and other electrical waves may also eventually prove useful. Further experiments on rain-making should be tried, and some good will probably eventually result, if it can only save coastal agricultural districts from severe drought.

BRITISH EMPIRE EXHIBITION.

Meeting of Agricultural, Viticultural, and Horticultural Group Committee.

The unique opportunity offered by the British Empire Exhibition to make more widely known the agricultural products and resources of Queensland is being fully seized by the Department of Agriculture and Stock, and at a meeting of the Agricultural, Viticultural, and Horticultural Committee of the Queensland State Commission of the British Empire Exhibition, held at the Head Office early in the month, plans for complete presentation of exhibits were advanced.

Attendance—

- H. C. Quodling, Chairman (Director of Agriculture);
- E. W. Bick (Curator, Botanic Gardens);
- W. G. Wells (Cotton Expert);
- H. W. Mobsy (State Organiser);
- H. T. Easterby (Director, Sugar Experiment Stations);
- W. G. Brown (Sheep and Wool Instructor);
- J. Ward (Fruit Instructor); and
- H. Hunter, Secretary.

A lengthy agenda paper had been prepared, and at the outset of the meeting the State Organiser (Mr. Mobsy) submitted his progress report. Included among the subjects dealt with were—

1. Allotment of Space for Agricultural Exhibits.

The plan of floor space submitted to the Federal Commission by the Victorian Government allowed for a total floor space of 5,436,794 square feet for all industries. Queensland's proportion of that space was 14 per cent., or in other words 757,634 square feet. There had been allotted to all States for agricultural displays a space of 18,736 square feet, and Queensland by its 12 per cent. share had at its disposal an area of 1,920 square feet.

In the plan as it stands at present Mr. Mobsy has suggested several alterations.

First of all, the original plan provides that the Wheat and Wool Trophies shall be situated right up to the front door of the building, but Mr. Mobsy's suggestion is that the Wheat Exhibit should go along with the Agricultural Exhibit, and the space so rendered vacant be occupied by an Information Bureau. As a further suggestion the Wool Trophy should be included in the Pastoral Section, and its present allotted space occupied by Trade Bureau Section. To these suggestions the Committee gave its concurrence.

2. General Character of Sectional Displays.

Discussion on this item was turned to the question of labelling exhibits. The Committee, after having given much consideration to this matter, were unanimously of the opinion that a uniform label should be adopted by all States, and it was suggested that each label should bear an outlined map of Australia showing the divisions of the several States; and the name of the exhibit should be printed on this map in lettering coloured to represent the State presenting same. The Committee delegated upon Mr. Mobsy the duty of preparing such a label for consideration by the Federal Commission.

3. Finance.

The Chairman asked each member present to furnish an approximate cost for the collection, delivery, storage, preparation, and display of the various commodities included in the Agricultural, Viticultural, and Horticultural Sections.

4. Exhibits—Collection and other Activities.

(a) *Wool*.—Whilst dealing with the Wool Exhibit a motion was passed to the effect that inquiries should be made of the Queensland State Commission as to the space allowed for Queensland in connection with this exhibit, and what quantity and class of wool was required, so that active steps could be taken to have a suitable exhibit procured.

(b) *Cotton*.—In view of the importance of Cotton to the Empire, a resolution was passed to the effect that provision be made for a representative display of Cotton in the Agricultural Section, and also that a Cotton Display be provided for on the wall space in close proximity to the Cotton Trophies. Mr. Wells promised to take up the matter of a suitable Queensland Cotton Display with the British Australian Cotton Association.

(c) *Sugar*.—Mr. Easterby promised to collaborate with the Colonial Sugar Refining Company and the Australian Sugar Producers' Association in connection with a suitable Sugar Exhibit.

(d) *Cereals*.—The Department of Agriculture has at present a large and representative collection of Queensland cereals, but provision will be made to have further specimens of this year's grain secured.

(e) *Grasses and Edible Shrubs*.—Whilst on this exhibit a motion was passed that the matter of the display of grasses and edible shrubs be brought up at the next meeting of the representatives of the Agricultural Departments, to be held in Sydney this month, and that consideration be given to the display of grasses on screens made to suit the design.

(f) *Fresh and Dehydrated Fruits*.—Mr. Ward expressed the opinion that a suitable and representative exhibit of dehydrated fruits could be obtained from the Dehydration Company now in operation at Nambour.

Pastoral and Refrigerated Products Committee.

The inaugural meeting of the Pastoral and Refrigerated Products Committee connected with the Queensland State Commission of the British Empire Exhibition was held at the Department of Agriculture and Stock, William street, on Thursday, the 26th ultimo.

The committee consists of the following members representative of the several industries comprised within this section, with Mr. E. Graham (Director of Dairying) as chairman—Messrs. R. H. Edkins and E. F. Summers (Pastoral, Frozen Meats and Meat Products); W. T. Harris, E. Turrell, and R. McWhinney (Dairying); A. H. Benson and W. Ellison (Fruit); J. Beard and W. Hindes (Poultry, Game, &c.); W. H. Mobsby, State Organiser; and M. L. Cameron, Secretary.

Space Allocation.

The committee reviewed the matter of space allocated tentatively by the Federal Commission, and it was decided that some slight modification, which would not interfere with the aggregate area of space, could be effected beneficially by common arrangement with the representatives of kindred industries in the other States.

Exhibits.

The committee discussed the procurement and arrangement of exhibits, and decided that the members of the committee should endeavour to collaborate with other representatives of the industries with a view to securing the produce necessary for the Queensland section of the forthcoming Empire Exhibition.

Several of the committee expressed the desirability of manufacturers being alive to the advantages of arranging, through the ordinary channels, for the supply of these commodities for consumption by those attending the Exhibition.

WIRE WORM IN SHEEP.

The subjoined article, abstracted from the Journal of the Department of Agriculture of the Union of South Africa, deals with the life-history of the wire worm of sheep, or stomach worm as it is known in Queensland, a parasite common enough here in many parts of the State and occasionally responsible for heavy losses, especially in lambs. In this connection Mr. John Legg, B.V.Sc., M.R.C.V.S., Government Veterinary Surgeon at Townsville, writes—

The life-history of this parasite (or *Hæmonchus cortortus* in scientific language) has been extensively studied by the Veterinary Research Staff of the South African Government, and an elaborate series of experiments with single drugs and with mixtures of drugs has revealed the fact that a combination of Sodium Arsenite and Copper Sulphate is the most effective medicinal agent that can be used in killing and removing this parasite from the digestive system of the sheep. It is this combination which is referred to in the article, and which has been repeatedly found on experiment to kill 100 per cent. of the adult parasites in the stomach.

The medicine is put up in tins, each containing 100 doses for adult sheep, and a series of graduated spoons is supplied, each holding exactly one dose for sheep of various ages. It may be given in the powder form by simply placing it on the back of the tongue with the spoon, or it can be dissolved in water with the addition of a little hydrochloric acid, and the liquid given as a drench or simply squirted into the mouth with a hypodermic syringe minus the needle. One hundred doses can be dissolved in a litre of water, with the addition of about 14 c.c. of hydrochloric acid, making the dose for one adult sheep 10 c.c. The doses are as follows:—

In Powder Form.

No. of Notches on Spoon.	For use on—	Quantity of Remedy.	Total.
One	Lamb, 2 to 4 months old	Sodium arsenite 36 mg. .. } Bluestone 144 mg. }	180 mg.
Two	Lamb, 4 to 6 months old	Sodium arsenite 50 mg. .. } Bluestone 200 mg. }	250 mg.
Three	Lamb, 6 to 10 months old	Sodium arsenite 75 mg. .. } Bluestone 300 mg. }	375 mg.
Four	Sheep, 2-tooth ..	Sodium arsenite 100 mg. .. } Bluestone 400 mg. }	500 mg.
Five	Sheep, 4-tooth and older	Sodium arsenite 125 mg. .. } Bluestone 500 mg. }	625 mg.

mg.—Milligrammes.

In Liquid Form.

For use on—	Quantity of Mixture.
Lamb, 2 to 4 months old	3 c.c.
Lamb, 4 to 6 months old	4 c.c.
Lamb, 6 to 10 months old	6 c.c.
Sheep, 2-tooth	8 c.c.
Sheep, 4-tooth and older	10 c.c.

c.c.—Cubic centimetres.

The results which have been achieved in South Africa in suppressing this parasite and the interest it has for many Queensland flock-owners, together with the experimental evidence which indicates the superiority of these drugs over all other combinations, would seem to warrant a testing of this medicinal agent under Queensland conditions.

THE LIFE HISTORY OF THE WIRE WORM OF SHEEP.

Introduction.

The wire worm of ruminants, scientifically known as *Hæmonchus contortus*, is a small thin worm which passes part of its life in the "fourth stomach" of sheep, cattle, goats, and other ruminants, including wild game such as buck. Its distinguishing scientific name "contortus" is given to it on account of the contorted or spiral appearance of the internal organs of the female. In the adult form the white ovaries of the female are rolled round the reddish intestine to form regular loops, and this gives it a spiral striping like a barber's pole. It lives by sucking blood from the mucous membrane, and from this blood its intestines derive their colour.

Post-mortem examination of an infected sheep shows the presence of the adult worms, rather over an inch in length and about as thick as an ordinary sewing needle. They are found either wriggling about in the stomach (abomasum) or in clusters round the stomach walls.

The general symptoms of acute wire worm infection are inflammation of the stomach and anæmia. This shows itself externally as a paleness of the mucous membranes of the mouth and eyes, loss of flesh and general weakness, accompanied by thirst, diarrhœa, and sometimes by a dropsical effusion (or watery swelling) under the jaw.

Lambs and young sheep are most seriously affected, but although fully-grown sheep also suffer they can sometimes harbour the worms for a long time without showing serious symptoms, provided the veld is in good condition and they obtain abundance of good food. Such *apparently healthy* adult sheep are a serious source of danger, since they keep the infection alive and, in their droppings, scatter eggs to infect the veld, and hence infect the rest of the flock.

There are six stages in the life-history of the worm—the egg, four "larval" or immature stages, and the adult. Half of these stages is passed in the stomach of the sheep, and the other half outside on the veld. The complete life-cycle may be indicated as follows:—

Adults.

Fully-grown males and females only live in the fourth stomach of sheep and other ruminants. Here they may thrive all the year round, although the degree of infestation depends upon the season. Once a sheep is infected with wire worms it may remain infected for a very long time unless measures are taken to eradicate the parasite.

The female is somewhat larger than the male, and is readily distinguished by the enlargement over the hind third of its length, corresponding to the egg-laying organs. When full size has been reached the average length is about 1 inch, and the average breadth about one-fiftieth part of an inch. The females are then fertilised by the males, and egg-laying begins.

Eggs.

The eggs then leave the stomach along with the food, pass through the intestines, and out with the droppings. The eggs are oval in shape and very small; only about one-four-hundredth part of an inch in length. The number which can be passed out by a badly infected sheep is enormous, and even an infected sheep which is still outwardly healthy in appearance may pass as many as 3,000,000 per day. The eggs then out hatch in the droppings on the veld, provided conditions of temperature and moisture are suitable. The warm wet weather of summer is most favourable, and hence spread of wire-worm infection is worst at this season. Hatching is very rapid, and may begin at once, since development of the eggs occurs even in passing through the intestines. Under favourable conditions eggs may hatch nineteen hours after being laid.

First Larval Stage.

When hatching occurs a small thread-like "larva" (immature development stage), about one-eightieth part of an inch in length, crawls out. This larva feeds on the manure in which it hatched, grows a little, forms a new skin, then moults or casts the old skin, and emerges as the second larval stage. The first larval stage is passed through in about one day.

Second Larval Stage.

At this stage the worm is about one-fiftieth of an inch in length, is very lively, and continues to feed on the droppings of the sheep. It then grows another skin, partially detaches the old skin while developing towards the third larval stage, and in this "ensheathed form" is called the "mature larva." The whole process takes less than two days, and the mature larval stage may therefore be reached about three days after hatching, provided conditions of warmth and moisture are favourable. It is in this stage that the worm is infective. Neither the egg nor the first larva can infect the animal, but at the mature larval stage the tiny worm proceeds to find a "host," i.e., a sheep or other ruminant, in which to complete its development. At this stage it is about one-thirtieth of an inch in length, can live for a long time, and is migratory in habit. It leaves the medium (dung of the sheep) in which it developed, and travels up the damp blades of grass. In eating the grass the sheep takes the matured larvæ into the stomach, and in this way becomes infected.

Third Larval Stage.

The worm now commences the parasitic part of its life (first parasitic stage), casts its detached skin (remaining from the second stage), continues its evolution, forms a third skin, moults again, and emerges as the fourth larval stage.

Fourth Larval Stage.

At this "fourth larval" or "second parasitic" stage, the worm commences to bore into the surface of the stomach, causing a slight effusion of blood. Within the blood clot so formed the larval worm is found. Growth continues, and a length of about one-fifth of an inch is reached in rather over a week, while at the same time differentiation of the sexes occurs. Male and female worms can then be distinguished. A fourth skin forms, is duly cast, and the young adult worm appears, the whole process being completed in about a fortnight from the time the mature infected larvæ entered the stomach.

Adult Stage.

This third parasitic or last stage of growth is completed in about another fortnight, during which time the worms grow from about a quarter of an inch in length to full size of one inch, and become sexually mature. Fertilisation then takes place, and the female begins to lay eggs, so completing the life-cycle of the worm.

Summary.

There are thus three non-parasitic stages—i.e., the egg, the first larva, and the second larva—passed outside on the veld; and three parasitic stages—i.e., the third larva, the fourth larva, and the adult stage (male and female)—passed in the stomach of the sheep. The time from entrance of the mature larva into the stomach until the first laying of eggs is about one month, and consideration of this period is, therefore, of the utmost importance in any system of dosing. If wire-worm is to be eradicated with certainty, dosing must be repeated at least once a month in order to prevent females from developing to the stage at which they can lay eggs and so perpetuate the infection. If they do manage to lay eggs these hatch out on the veld, develop, promptly reinfect the sheep, and restore the vicious cycle.

Influence of Season.

Since moisture and warmth are necessary for development of the eggs and early larval stages, veld infection is greatest during the warm, wet periods of the year. The infected larval stage may be reached in three days in warm weather, but only in three weeks in cold weather, and not be reached in frosty weather at all. A reduced infection of the veld may, however, prevail all the year round, especially in vleis, since the mature larva in its "sheathed form," and with its capacity for "migrating" or wandering along moist surfaces will live for a long time. Exposure to direct sunlight or drought will kill it, but under such adverse conditions it returns to the soil to hide, only coming out again to crawl up the grass in dull, damp weather. If, of course, the worms never find a "host"—i.e., sheep or other ruminant—they finally die a natural death. The two practical points to remember are—

- (1) That an infected pasture may remain infected for at least a year, and that all sheep grazing on it during this time are liable to become infected.
- (2) That a living sheep spreads the infection so long as adult wire-worms are present in the stomach.

Eradication of Worms.

In order to suppress the wire-worm plague, it is therefore necessary to kill the wire-worms in the stomach of the sheep and to clear the farm of mature larvæ. The first task can be accomplished by using the Wire-worm Remedy supplied by the Division of Veterinary Education and Research (this remedy consists of a combination of arsenic and desiccated copper sulphate). The second is more difficult, and takes longer to accomplish. One method would be, of course, to keep away all animals which act as hosts (sheep, cattle, goats, buck) for at least a year, and so leave the larvæ to die a natural death, but this method is not feasible in ordinary farming. The other method is to allow the sheep to pick up the larvæ in grazing, but to kill them off in the stomach before they reach the egg-laying stage. Since the parasitic worm takes from three weeks to a month to reach sexual maturity, the treatment involves regular dosing at least once a month, especially during the rainy season. If this is done, no eggs are laid, no fresh infection on the veld occurs, and the larvæ which are not picked up by the sheep die in time. The farm is then clean, and provided no further infection is brought in from other areas dosing is no longer necessary. Although the possibility exists that the infection may be kept alive by ruminants other than sheep (cattle, buck), experience has shown that these cattle are only rarely infected, and hence systematic dosing of sheep and goats is generally sufficient to eradicate the disease. In the rare cases in which infected buck, with which dosing is impossible, do keep the infection alive, periodic dosing of the sheep and goats may have to be continued indefinitely. It must be remembered that the Wire-worm Remedy is a cure and not a preventative. It kills the worms in the stomach, but, of course, passes out of the stomach with the food, and hence cannot prevent reinfection. There is, therefore, no practical way of preventing reproduction of the worms except by killing them off regularly once a month until the source of infection on the veld itself disappears.

It may be added that the directions for use of the Government Remedy are arranged to eradicate worms as completely and quickly as possible without danger of poisoning the sheep. They are, therefore, more drastic than most remedies on the market, especially in regard to preliminary starvation treatment. Even if used under the less drastic conditions advertised for other remedies, however, the Government Remedy is as effective as any of them.

Analogy with Tick Eradication.

The principle underlying these recommendations will perhaps be clearer if it is compared with the principle of eradication of ticks. Ticks cannot be prevented from attaching themselves to the stock, and cannot be killed out in the grass in any feasible method. The stock, therefore, collect the ticks, but if the stock are regularly dipped the collected ticks are either destroyed or do not lay fertile eggs, and hence do not perpetuate the infestation. The ticks which do not attach themselves to stock die a natural death in course of time, and hence after a year or two of regular dipping the farm becomes clean. In the same way the sheep collect the wire-worm larvæ, and the dosing destroys them. In the case of ticks, short intervals between dippings, three to fourteen days according to the kind of ticks, are necessary, because the ticks breed very quickly after attaching. In the case of wire worms an interval of three to four weeks between dosings is sufficient to prevent breeding. If the dosing is systematically carried out the wire worms will be rapidly reduced to negligible numbers, just as ticks are reduced by dipping.

Diagnosis by Means of Culture.

A practical and easy method of finding out to what extent sheep are infected with wire worms, even before they show the ill-effects of the infection, is to cultivate the eggs from the droppings and observe the migrating larvæ. Every farmer can do this for himself by collecting fresh moist droppings from the suspected sheep, placing them in a glass jam-jar, placing the jar in a comfortably warm cupboard, and watching events from day to day. Provided the droppings have been sufficiently moist, a fine dew deposits on the sides of the glass, and from the fourth day onwards the larvæ, which have developed from the eggs passed out by the sheep in the droppings, begin to migrate, and form slimy white tracks ramifying over the surface of the glass. If the glass is now exposed to strong light, the larvæ will be observed to return to the droppings, and enter them again, provided they are still sufficiently wet. It should be added that "sour fæces" are unsuitable for culture, but that in most cases the experiment is successful, instructive, and useful.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS FOR MARCH, 1923.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Yarraview Village Belle	Guernsey ...	19 Feb., 1923	651	5·6	43·09	
Royal Mistress ...	Ayrshire ...	25 Nov., 1922	720	3·5	29·40	
Bellona ...	" ...	30 Aug., "	570	4·5	29·40	
Pretty Maid of Harelmarr	" ...	11 S pt., "	600	4·1	28·80	
Lady Peggy ...	" ...	18 Nov., "	720	3·4	28·50	
College La Cigale	Jersey ...	10 July, "	410	5·5	26·65	
College Meadow Sweet	Friesian ...	18 Sept., "	560	3·4	26·10	
Confidence...	Ayrshire ...	13 Aug., "	570	3·9	26·10	
Yarraview Snow-drop	Guernsey ...	1 Sept., "	420	5·0	24·60	
College Mignon ...	Jersey ...	20 Nov., "	450	4·6	24·30	
Fair Lassie ...	Ayrshire ...	1 Sept., "	480	4·3	24·0	
Thyra of Myrtle-view	" ...	22 Aug., "	510	3·9	21·90	
Nina ...	Shorthorn...	12 Jan., 1923	600	3·1	21·60	

PROPOSED EGG BOARD.

A notice has appeared in the "Government Gazette" of the intention to declare that eggs (exclusive of those used for breeding purposes) produced in all that portion of Queensland lying east of a straight line from Bundaberg to Goondiwindi, and which are produced by persons keeping 100 or more hens, turkeys, ducks, geese, or guinea-fowls (including the males), shall be for two years from the 1st June, 1923, a commodity under "The Primary Products Pools Act of 1922," and to constitute an Egg Pool for such eggs. The persons who shall be eligible to vote on any Referendum or Election in connection with the said Pool prior to the 1st July, 1923, shall be persons keeping on the 1st May, 1923, at least 100 fowls as described above. Persons eligible to vote on any future Referendum or Election in connection with the Pool shall be persons who at any time during the preceding six months prior to the date of such Referendum or Election kept 100 or more fowls as above.

A notice is also being issued calling for nominations for the proposed Egg Board. These nominations will be received by the Under Secretary, Department of Agriculture and Stock, Brisbane, up to the 14th May, 1923. The Board will consist of five members, and each of the following districts shall return one representative:—

No. 1 District.—The Petty Sessions Districts of Bundaberg, Gin Gin, Mount Perry, Eidsvold, Childers, Maryborough and Biggenden, Gayndah, Tinana, Gympie, Kilkivan, Wienholt, Nanango, Maroochy, Caboolture, Woodford, and Kilcoy.

No. 2 District.—The Petty Sessions District of Redcliffe, and that portion of Brisbane north of the Brisbane River.

No. 3 District.—The Petty Sessions Districts of Wynnum, Cleveland, and that portion of Brisbane south of the Brisbane River.

No. 4 District.—The Petty Sessions Districts of Logan, Southport, Nerang, Beaudesert, Goodna, Ipswich, Lowood, Esk, Marburg, Harrisville, Dugandan, Rosewood, Laidley, Gatton, and Helidon.

No. 5 District.—The Petty Sessions Districts of Toowoomba, Clifton, Pittsworth, Allora, Warwick, Killarney, Inglewood, Texas, Goondiwindi, Stanthorpe, Highfields, Crow's Nest, Oakey, Goombungee, Cooyar, Jondaryan, Cecil Plains, and Dalby.

Each nomination must be signed by at least ten producers of eggs as above.

A roll is being compiled of persons eligible to vote on any matter in connection with the proposed Egg Pool, but in order to insure their names being on such roll, keepers of 100 fowls or more as above are invited to send their names at once to the Department of Agriculture and Stock.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MARCH IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MARCH, 1923 AND 1922 FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Mar.,	No. of Years' Records.	Mar., 1923.	Mar., 1922.		Mar.,	No. of Years' Records.	Mar., 1923.	Mar., 1922.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
	In.		In.	In.		In.		In.	In.
Atherton ...	8.97	22	11.09	5.91	Nambour ...	9.52	27	3.71	0.92
Cairns ...	18.04	41	21.03	11.24	Nanango ...	3.37	41	4.65	0.60
Cardwell ...	16.27	51	7.27	9.06	Rockhampton ...	4.87	52	0.55	1.59
Cooktown ...	15.09	47	29.91	19.55	Woodford ...	8.13	36	4.64	1.39
Herberton ...	8.34	36	5.98	5.91					
Ingham ...	16.08	31	5.79	11.14					
Innisfail ...	25.86	42	22.51	15.74					
Mossman ...	18.86	15	18.14	23.08					
Townsville ...	7.76	52	0.38	1.34					
<i>Central Coast.</i>					<i>Darling Downs.</i>				
Ayr ...	7.20	36	0.63	1.01	Dalby ...	2.72	53	1.53	0.48
Bowen ...	5.92	52	1.11	2.11	Emu Vale ...	2.62	27	0.61	1.10
Charters Towers ...	3.77	41	0.50	8.12	Jimbour ...	2.63	35	2.70	1.57
Mackay ...	12.42	52	4.73	2.15	Miles ...	2.73	38	0.35	0.85
Proserpine ...	12.31	20	4.75	4.33	Stanthorpe ...	2.76	50	2.13	1.20
St. Lawrence ...	5.97	52	0.17	0.15	Toowoomba ...	3.89	51	1.33	0.94
					Warwick ...	2.66	58	1.70	0.22
<i>South Coast.</i>					<i>Maranoa.</i>				
Biggenden ...	4.17	24	2.87	0.65	Roma ...	2.81	49	1.76	0.55
Bundaberg ...	5.44	40	0.48	1.07					
Brisbane ...	5.79	72	2.34	2.01					
Childers ...	5.02	28	0.68	0.54					
Crohamhurst ...	11.69	30	6.18	2.17					
Esk ...	4.83	36	5.85	0.98					
Gayndah ...	3.27	52	1.88	1.53					
Gympie ...	6.26	53	2.50	2.01					
Glasshouse Mts. ...	9.25	15	5.19	1.54					
Kilkivan ...	4.03	44	1.79	1.87					
Maryborough ...	6.30	52	2.41	0.80					
					<i>State Farms, &c.</i>				
					Bungewongorai ...	1.64	9	0.56	0.26
					Gatton College ...	3.41	24	2.19	0.03
					Gindie ...	2.81	24	2.62	0.80
					Hermitage ...	2.51	17	0.52	0.36
					Kairi ...	7.90	9	...	7.15
					Sugar Experiment Station, Mackay	11.53	26	2.82	1.59
					Warren ...	2.74	9	...	1.01

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for March, 1923, and for the same period of 1922, having been compiled from telegraphic reports, are subject to revision.

J. H. HARTSHORN,
Acting State Meteorologist.

DEPARTMENTAL APPOINTMENT.

J. P. Donlevy, of Cairns, has been appointed Government representative on the Cook Dingo Board during the absence of the Government representative, Mr. A. H. Scott.

The resignation of R. M. Troy, as millowners' representative on the Gin Gin Local Sugar Cane Prices Board, has been accepted, and Mr. N. E. Annand has been appointed in his stead.

Police Constable J. Topp, of Wyandra, has been appointed an inspector under "The Slaughtering Act of 1898."

THE COMMERCIAL PICKING, GRADING, AND PACKING OF APPLES, PEARS, PEACHES, TOMATOES, AND PLUMS.

By WM. ROWLANDS, Packing and Grading Instructor, Queensland.

THE above-mentioned fruits are grown in such large commercial quantities in so many States that it is not profitable to produce or send to market any fruits unless they are of good shipping quality. A few purchases of the fruits mentioned that are immature or otherwise unsatisfactory will turn the consumer to other fruits. Therefore growers should use every endeavour to keep the markets free of fruits of undesirable

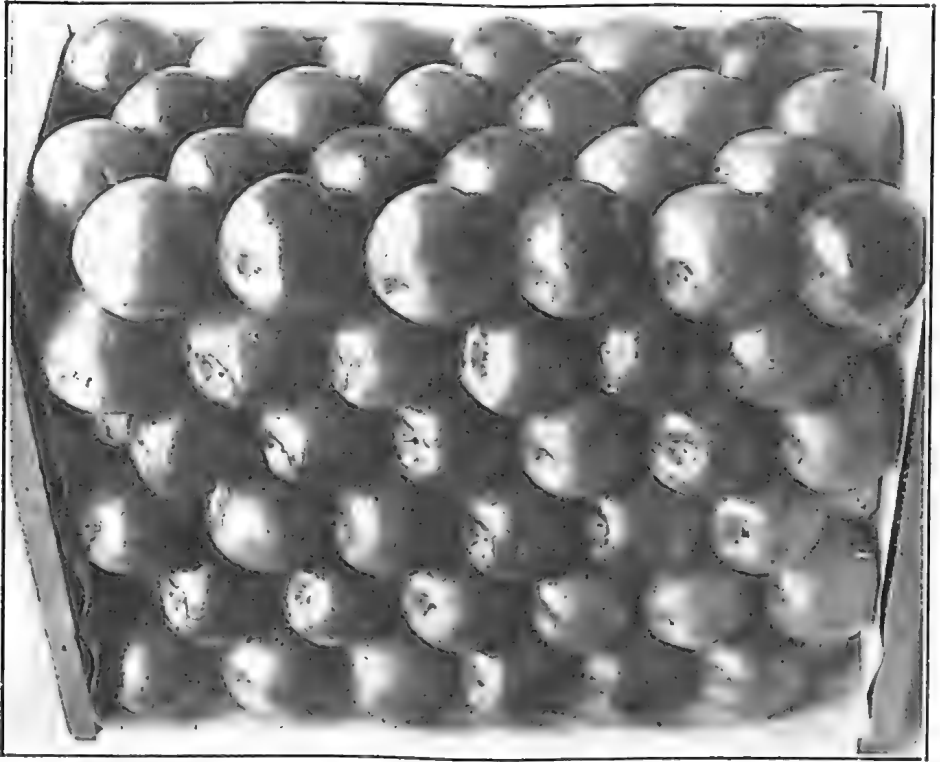


FIG. 1.—WELL-PACKED CASE OF 2½-INCH APPLES, SHOWING TOP AND SIDE VIEW.

NOTE PART OF APPLE SHOWING AT SIDE.

variety and quality. This bulletin is designed to aid growers and shippers in preparing their fruits for markets in such a way that they may realise higher average returns with fewer losses. Growers must bear in mind from the start that it is absolutely necessary to grow and produce fruits of good quality to compete against other States. Readers should study the illustrations thoroughly.

DEMAND FOR WELL GRADED AND WELL PACKED FRUIT.

Experienced produce merchants will agree with the statement that any fruit or vegetable of desirable variety, well grown, carefully harvested, properly graded and sized, is more than half sold. On the contrary, fruits poorly grown or carelessly prepared for market are always disposed of under a decided handicap. The appearance of an article of fruit is the first point noticed by the consumer, the retailer, and the wholesaler. If the product is exhibited in dirty or damaged cases, if it is slack-packed, decayed, or not sized or graded for quality, the best "trade" will pass it by for other shipments of better quality and appearance. Years of observation on the part of those closely connected with the fruit business warrant the statement that markets are rarely glutted with fruits of first-class grade, size, and appearance. High-grade products will sell, and usually at a profit to the grower, even when ordinary or poor grades are going to waste. This situation is to be expected, since it is natural for both dealers and consumers to want the best. On a normal market the higher grades may be out of reach of many on account of the price, but when a market is glutted and the quotations drop, the "trade" will become more and more discriminating, the well-graded and well-packed will be taken and the inferior stock left or sold at a sacrifice. Wholesalers and retailers know that the higher the quality of their goods the less the chance of loss in deterioration, time, and customers. Every grower and shipper of fruits should realise that when profits accrue from their business, they generally are due to the marketing of produce of good quality and appearance. In certain years of scarcity poor fruits may be disposed of at a profit, but in the great majority of cases they are a source of loss to all persons engaged in handling them.

CARE IN HANDLING.

Many growers realise that care in handling during picking, grading, packing, and carting is necessary if they are to obtain profitable results, while others, either through ignorance or because of carelessness or indifference, subject their fruit to early decay and spoilage through needless rough handling during these operations. A great deal of rough handling is due to lack of knowledge of what constitutes careful handling. It is not generally realised that it is necessary to preserve the skin of any fruits in a sound, unbroken condition, "especially when fruit is intended for cool storage." Growers must awaken to the fact that it is their business to see that their pickers, packers, graders, and carters each do their share to eliminate rough handling. The writer has noticed that growers and others when carting use a full case of packed fruit for a seat. This is a bad practice and should be avoided. The case so used may be opened by the agent to sell the whole of that particular consignment. In Launceston recently a case was opened to show a grower the result of such treatment, and it was found that 90 per cent. of the fruit therein was badly bruised, while the remainder of the load was perfectly sound.

ORCHARD BOXES.

The use of orchard boxes cannot be too strongly insisted upon in harvesting fruits of any kind. Shipping cases, when used for handling fruit in the orchard, almost necessarily become soiled and warped, and a soiled case is a cheap case, notwithstanding the grade of fruit that may be in it. The writer suggests the use of second-hand benzine and petrol cases for this purpose. These cases, if banded with hayband wire, will last for several years; they are much lighter and also much cheaper to the grower (wiring benzine cases being good employment for pickers on wet days). One Tasmanian orchardist during the 1918 season made 500 cases as suggested, and after four seasons' picking still has the original 500, not one being broken. (See Fig. 2.)

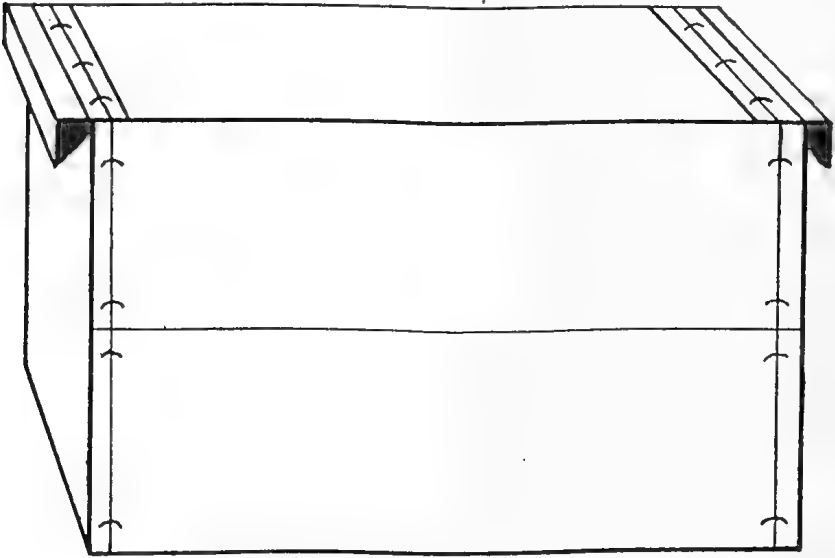


FIG. 2.—ORCHARD BOX.

APPLES.

Picking.

An all-important matter to be first considered is the correct time for harvesting. The proper picking of apples is a most important operation in preparing this fruit for market. The best judgment must be exercised in selecting apples in the right stage of maturity to carry properly. Experience on the part of the growers and pickers is necessary if good results are to be obtained. As a matter of fact, it is difficult to make a rule that will state just when any particular kind should be picked, for so much depends on such things as variety and district and seasonal conditions; and directions that may apply in one district will not necessarily hold good in another. Colour of the fruit is taken by some growers as a deciding factor in determining when to pick, while others rely on the falling of the fruit from the trees. In order to pick apples at the

proper stage of maturity, orchardists must learn the traits and characteristics of each variety in his own particular district. For example—the Gravenstein has a tendency to fall before ripening; on the other hand, if left on the trees too long it may develop core-rot. Jonathans fall at the time of ripening, while Sturmers, Croftons, and Tasmas may be left on the trees several weeks after most other varieties have been picked.

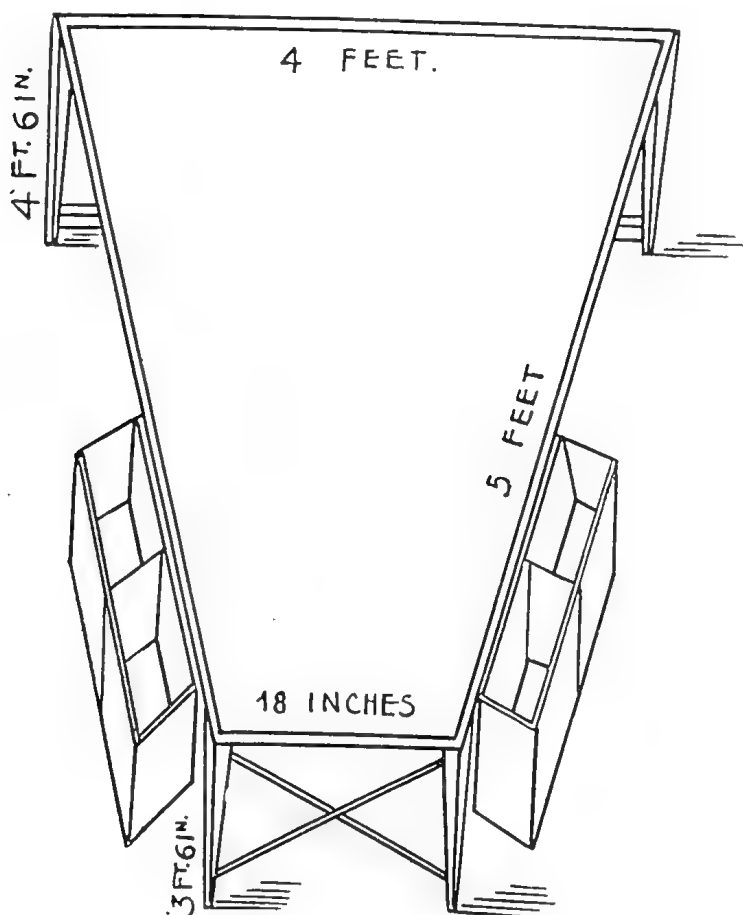


FIG. 3.—ORCHARD BIN.

Number of Pickings.

Many growers strip their trees when picking (that is, pick all the fruit, large or small, mature or immature). Growers should realise that a crop of fruit is not to be treated like a wheat or hay crop by making a clean sweep at picking time; instead, they should take the fruit as it matures, thereby getting a 10 to 20 per cent. better average and simplifying grading and sizing. The more prosperous and experienced orchardists make three to four pickings of apples.

Damage During Picking.

The writer is of the opinion that 50 per cent. of damage to fruit occurs during picking, and suggests to growers who employ pickers to demonstrate to them how to pick at the beginning of each season, and to impress on them the necessity for careful handling.

Hints to Pickers.

Do not squeeze fruit when picking.

Do not drop fruit into picking bags or buckets.

Do not empty fruit from your bags or buckets into cases roughly.

Do not pick up windfalls and mix with freshly-picked fruit.

The picking up of windfalls should be a separate operation.

Always place the orchard boxes on the shaded side of the tree when full. A few hours in the sun after picking is not good, especially when fruit is intended for cool storage. This is very important.

Sizing and Sorting.

Perfect sizing is essential if perfect packing is to be done.

There are several methods of sizing, by machine and by hand.

Of recent years great improvements have been made in the mechanical sizers. There are several makes of these machines in use in Australia, including the Ideal, Lomas, and the Nelson. It is not our purpose to recommend any particular one. The great essential, however, is to size properly, whether by hand or machine. If apples are sized into four dimensions—namely, $2\frac{1}{4}$ inch, $2\frac{1}{2}$ inch, $2\frac{3}{4}$ inch, and 3 inch—they will meet all requirements for the export trade. Larger or smaller should not be sent to distant markets. In determining the size of apples, they are measured from cheek to cheek, not from calyx to stem. When sizing is done by hand, rings or wooden gauges cut to the required sizes may be employed, not necessarily for every apple, but when the person sizing is in doubt. Apples that drop through the $2\frac{1}{2}$ -inch ring and remain on the $2\frac{1}{4}$ -inch ring are $2\frac{1}{4}$; those remaining on the $2\frac{1}{2}$ -inch ring after passing through the $2\frac{3}{4}$ -inch ring are $2\frac{1}{2}$ -inch apples; and those passing through the 3-inch ring and remaining on the $2\frac{3}{4}$ inch are $2\frac{3}{4}$ -inch apples. Thus it will be seen that nearly a quarter of an inch variation is allowed. If one-size apples are $\frac{1}{8}$ of an inch under or over the dimensions above, it will, of course, make much difference in packing. When possible, sizing and packing should be treated as two distinct operations, and performed by different and specially trained workers. The persons sizing should not only size, but throw out all undesirable specimens. The packers should be free to give attention to securing a pack of standard quality which is both firm and attractive. Sizing operations would be simple if growers made several pickings from each tree as suggested on page 390, under the heading of "Number of Pickings."

Packing.

We can look back over past years and note the evolution of packing, from the old "rough" pack to the "square" pack, and lastly to the "diagonal" pack, which is recognised as the standard throughout prosperous fruitgrowing centres. It has been the object in other States to simplify the method of packing and lessen the variation of packs. At the present time standard "diagonal" packs are exclusively used throughout New Zealand and America. Growers and packers must, therefore, bear in mind that badly-packed apples placed upon the larger markets will come into direct competition with those from other States and New Zealand, where packing has attained a degree of efficiency and excellency difficult to surpass.

In Tasmania there are two packs, known as the "square" pack and the "diagonal" pack. The diagonal is the pack recommended as the only pack to suit our dump case. The name "diagonal" is derived from the fact that the rows of apples resting cheek to cheek always produce diagonal lines across the layers to which they belong, and when the case is opened—whether at top, side, or bottom—the same effect is produced. To pack all commercial apples only three distinct packs are necessary, embracing six different sizes (that is, if sized to the $\frac{1}{4}$ -inch); thus it will be seen that any deviation from the three packs mentioned is unnecessary. These three packs are known as the 3—2, 2—2, and 2—1. The 3—2 pack is for medium or small apples, and the 2—2 is for $2\frac{1}{2}$ -inch apples up to and inclusive of $2\frac{7}{8}$ inch. The 2—1 pack comprises 3-inch, $3\frac{1}{4}$ -inch, and $3\frac{1}{2}$ -inch. It may be mentioned, however, that sometimes, owing to the ends of the case not having shrunk to the required size—viz., $8\frac{3}{8}$ inch— $2\frac{1}{2}$ -inch apples may pack 3—2, but this is not often the case. However, with a little commonsense on the part of the packer, he will soon discover if 3—2 or 2—2 is needed. Figs. 9 10, and 11 illustrate the method of determining the different packs. It cannot be too strongly emphasised that no benefit is gained and only confusion caused by attempting any other packs than the three mentioned above. All these are diagonal packs. By this is meant that the apples are arranged in rows, with each apple touching the one next to it. Another distinction between the diagonal and square packs is that in the diagonal the apples are placed over the spaces between the specimens below, and not directly on top of them, as in the square packs. In order to be a successful packer, it is necessary for the beginner to follow closely the instructions here. Any deviations are unnecessary, and will lead to disappointment and confusion. The same will apply to those who have endeavoured to master the art either without proper tuition or along less up-to-date lines. Experience has proved that the diagonal pack makes it possible to pack firmly practically any sized apples, resulting in a better commercial pack from all viewpoints. Bruises are reduced to a minimum, the pack is firm and elastic and will not shift, and a more attractive article is placed on the market, commanding a more ready sale. It is not recommended to bulge-pack the dump case.

2—1 Pack.

This pack is for large apples, three of which are too large to fit across the case side by side (see Fig. 9). It includes three sizes—3-inch, $3\frac{1}{4}$ -inch, and $3\frac{1}{2}$ -inch. Fig. 4 illustrates the correct method of commencing the pack of a flat shape variety. Fig. 8 applies to conical-shaped varieties. In both the illustrations mentioned it is necessary to note the placing of apples 1 and 2. The placing of the first two apples in each layer will determine the spacing necessary to bring five layers to the correct height

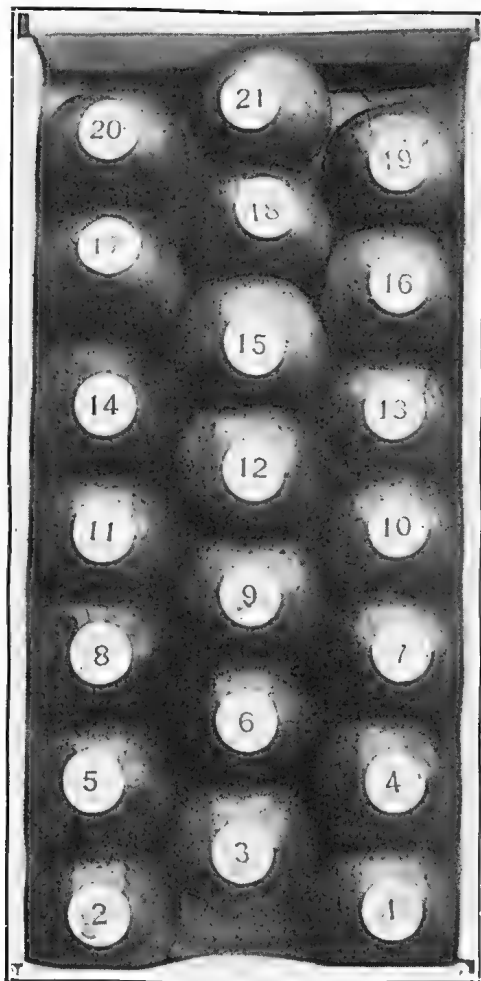


FIG. 4.—3-INCH. NOTE THAT APPLES NOS. 1 AND 2 ARE PLACED FLAT AGAINST END OF CASE.

in the case. (Packers must remember that 3-inch apples include all larger sizes up to $3\frac{1}{4}$ -inch, similarly $3\frac{1}{4}$ -inch allow a variation up to $3\frac{1}{2}$ -inch—a quarter of an inch variation.) To commence this pack start as shown in Figs. 4 and 8, which show completed layers of flat and conical-shaped varieties. The second layer is commenced with one apple placed over the space between the first two in the first layer, the third

layer is identical with the first, the fourth the same as the second, and the fifth and last layer is similar to the first and third layers. Experience has shown that all apples packed in the Tasmanian dump case pack the correct height in each case if packed on the cheek.

2—2 Pack.

Generally speaking, the 2—2 pack is the most important, because it embraces those sizes which are successful export sizes—viz., $2\frac{1}{4}$ -inch and

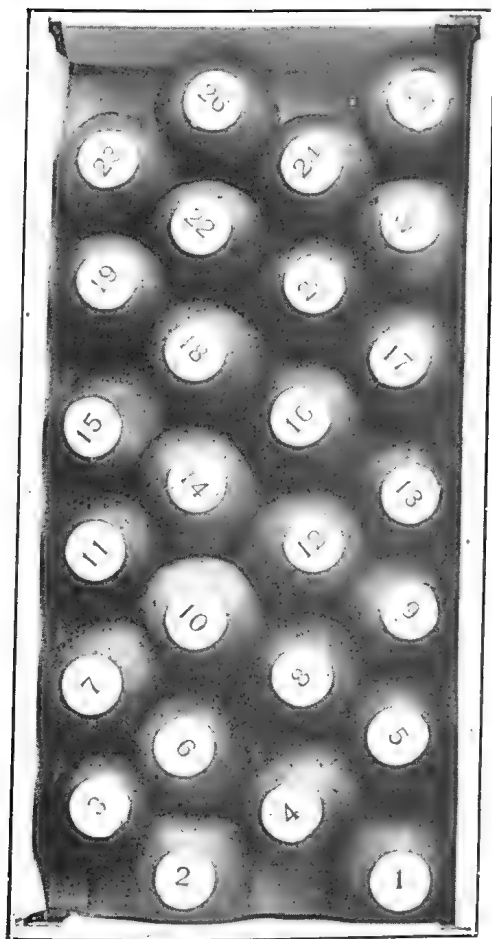


FIG. 5.

FIG. 5.— $2\frac{1}{4}$ -INCH. NOTE THAT APPLES NOS. 1 AND 2 ARE PLACED FLAT AGAINST END OF CASE.

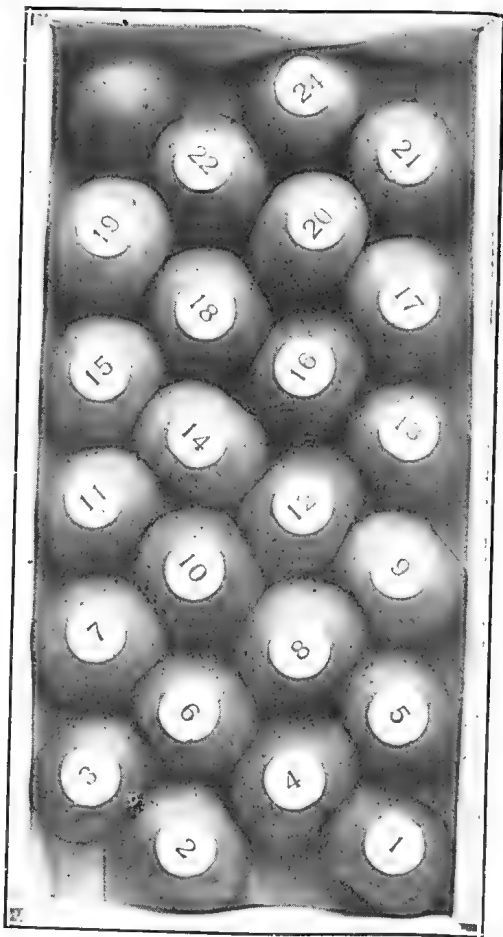


FIG. 6.

FIG. 6.— $2\frac{1}{4}$ -INCH. NOTE THAT APPLES NOS. 1 AND 2 ARE PLACED AT AN ANGLE WITH END OF CASE.

$2\frac{1}{2}$ -inch apples. It must be borne in mind that this pack is used when only three apples of the same size fit loosely side by side across the box and the fourth will not fit in. If four fit in side by side the pack will, of course, be 3—2 (see Fig. 10). This pack is commenced as shown in illustration (Fig. 5). Take particular notice of the placings of

apples one and two. Readers will note that the first two apples, $2\frac{1}{2}$ -inch (Fig. 5), are placed flat against the end of the case, while in Fig. 6 ($2\frac{3}{4}$ -inch) the first two are placed at an angle, each successive layer is placed the same until the case is finished, remembering that apples are placed in the spaces of previous layers. Placing the first two apples as pointed out in Fig. 5 brings the remainder of the layer closer together, with the result that six layers of $2\frac{1}{2}$ -inch apples fill the dump case to a nicety. The procedure for the $2\frac{3}{4}$ -inch apples differs slightly from the $2\frac{1}{2}$ -inch, as will be noted in Fig. 6. The first two apples are placed at an angle, as shown in the Fig. 6. By placing them at this angle the spaces between the apples are increased, thus allowing six layers of $2\frac{3}{4}$ -inch apples to be packed conveniently. If the instructions are followed no difficulty will be experienced in making a good finish of either the $2\frac{3}{4}$ -inch or $2\frac{1}{2}$ -inch sizes of apples.

3—2 Pack.

The 3-2 pack is used mostly for $2\frac{1}{4}$ -inch and 2-inch apples. Two-inch apples are rarely exported, therefore I will deal mainly with $2\frac{1}{4}$ -inch. Readers are referred to illustration (Figs. 7 and 9), which shows the

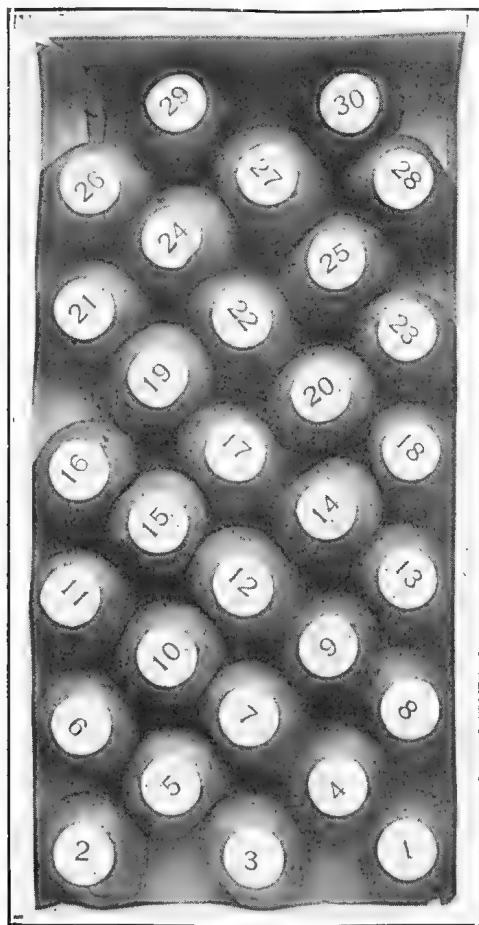


FIG. 7.— $2\frac{1}{4}$ -INCH. NOTE THAT APPLES NOS. 1, 2, AND 3 ARE PLACED AT AN ANGLE WITH END OF CASE.

completed layers of $2\frac{1}{4}$ -inch "flat" variety and $2\frac{1}{2}$ conical variety. It will be noted that all apples are placed at an angle and continued so right through the case, making sure that only the "shoulder" of the apple touches the side of the case, taking care the alignment is maintained throughout the case, and at the same time remembering that each consecutive layer must be placed in the spaces of the previous layers.

Notes for Packers.

A little care and trouble should be taken at the beginning, and speed will come with practice.

Take care not to hump the first apples in each layer against the end of the case.

Packing requires a certain amount of skill. Packers should adapt themselves and remember the various packs.

Particular notice should be taken of the illustrations, noting the placings of the first few apples.

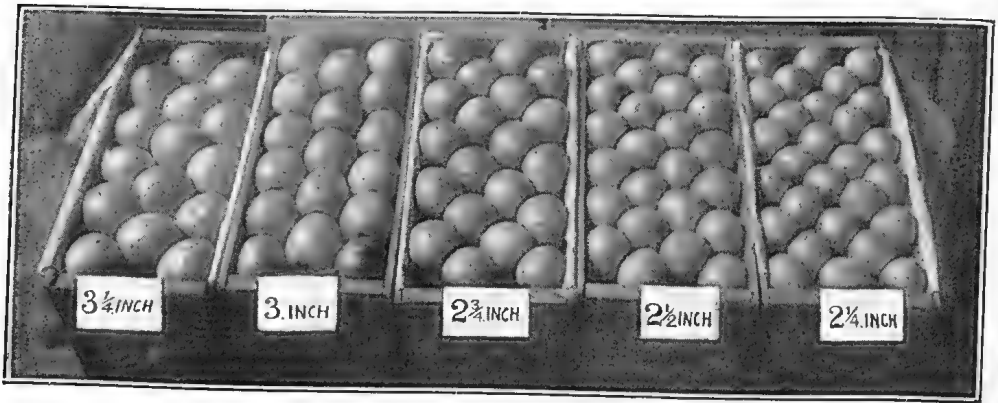


FIG. 8.—THE METHOD OF PACKING CONICAL-SHAPED APPLES. IT WILL BE NOTED THAT THE APPLES IN THE $2\frac{1}{2}$ -INCH AND 3-INCH PACKS ARE PLACED FLAT AGAINST THE END, WHILE THE $2\frac{1}{4}$ -INCH, $2\frac{3}{4}$ -INCH, AND 3-INCH ARE PLACED AT AN ANGLE.

Remember the packs illustrated are for use only in the "Tasmanian dump case," inside measurements of same being 18 in. by $14\frac{1}{4}$ by $8\frac{2}{3}$, equalling 2,223 cubic inches.

Packing is repetition of the same motions many hundred times during the day. If, therefore, one unnecessary motion is made with each specimen, it becomes a serious handicap in a day's work.

Remember that the first two apples of 3-inch, $2\frac{3}{4}$ -inch, and 2-inch sizes must be packed flat against the end of the case, and the first two apples of the $2\frac{1}{4}$ -inch, $2\frac{3}{4}$ -inch, and $3\frac{1}{4}$ -inch should be packed at an angle. (See illustrations.) Packers will have little difficulty if the illustrations are followed closely.

It is extremely difficult for packers to size and pack at the same time. In the past this was practised in Tasmania largely with a view to economising, but experience has proved that it is not successful. Packers are apt to include larger apples to fill their cases if by chance the second last layer is too low, or smaller apples if the second last layer is too high. This fact has been responsible for disappointment after the

fruit has reached the markets. It is now generally required that fruit must be sized before going to the packers.

METHODS BY WHICH PACKER WILL DETERMINE PACKS TO BE USED.

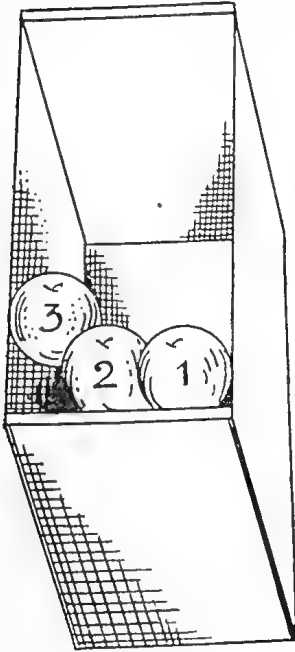


FIG. 9.

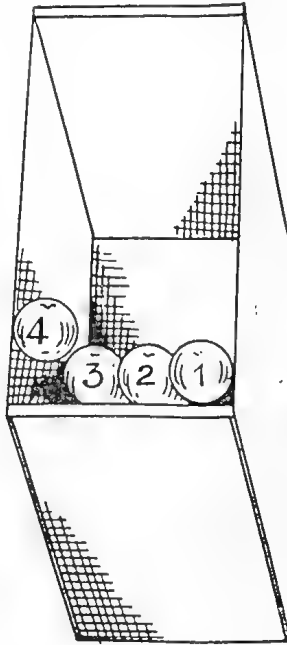


FIG. 10.

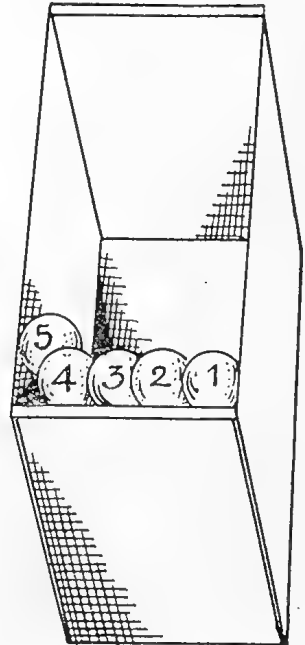


FIG. 11.

FIG. 9.—IF TWO APPLES OF THE SAME SIZE FIT LOOSELY ACROSS THE CASE SIDE BY SIDE, AND THE THIRD WILL NOT GO IN, THE PACK IS 2—1; FIVE LAYERS TO A CASE.

FIG. 10.—IF THREE APPLES OF THE SAME SIZE FIT LOOSELY ACROSS THE CASE SIDE BY SIDE, AND THE FOURTH WILL NOT GO IN, THE PACK IS 2—2; SIX LAYERS TO A CASE.

FIG. 11.—IF FOUR APPLES OF THE SAME SIZE FIT LOOSELY ACROSS THE CASE SIDE BY SIDE, AND THE FIFTH WILL NOT GO IN, THE PACK IS 3—2; SEVEN LAYERS TO A CASE.

Very Fast Packing.

In the past packers have been usually paid by the case for their work; hence it is obvious they wish to pack the greatest number of cases possible each day. Therefore, results are not likely to be satisfactory. Very fast packing is not recommended, for the following reasons:—

(1) Fast packing tends to slum, and wrapping-paper is not placed round the apples properly; therefore its value is much lessened.

(2) In putting the first apples in each layer against the end quickly they bruise. It has been noticed repeatedly during inspection that the apples in the end of the case where the pack starts are bruised, and apples in the other end are quite sound.

Some packers in Tasmania pack between 100 and 150 cases in eight hours, but the writer, after packing in different parts of Australia and New Zealand, has noticed that the best results have been obtained from packers whose capacity is between 50 and 80 cases. The packer who packs 50 to 80 cases in eight hours, and packs them well, is worth more to his or her employer than the packer who packs over the 100 and slums them. Every packer should make a habit of packing each case firmly, but under no circumstances should apples be forced into position. It has been noticed in some sheds that packers, after packing the best part of the case, will spoil the whole case by pressing the last apple into position, often cutting or bruising same on top end of the case, with the result that decay sets in.

PEARS.

Urgent Need for Better Grading and Packing.

In all districts and on every crop about half of the marketing troubles appear to be concerned with the problem of securing a steady and properly prepared output of uniform grade, quality, and appearance. It would not be difficult to obtain such results if all the individual growers in the community produced crops of the same quality and variety, handled them in the same way, and were both competent and willing to grade and pack them correctly. However, such conditions are rarely found. Too often growers ship pears which they acknowledge are not of desirable quality—fruit which they themselves would not eat. If growers of this type can get their poor fruit past the inspector, or conceal it in their carts under fruit of better appearance, they feel they have profited. Unfortunately, this does not end the matter. The wholesaler will have difficulty in disposing of the poor fruit, while the retailer, in turn, probably will lose on it. If it reaches the housewife she will throw it away, and turn to other fruits of better quality, thus decreasing the sale of further consignments. In all these cases the grower eventually loses, directly or indirectly. If the actual loss in money is not deducted from his net returns, he suffers from the injury done his reputation and that of the industry generally. At first thought it would seem reasonable to expect the agents, shippers, or distributors to eliminate such practices, but there is as a rule so much competition among them that they do not accomplish the reforms which individually they know to be desirable. These various weaknesses in the methods now in general use, which are preventing a much-needed improvement in marketing apples and pears, argue for a more efficient system of grading, packing, and inspection of this product.

Picking.

With the pear the proper time for picking may be told best by taking the fruit in the full of the hand and giving it a lateral twist, with the stem taking leverage over the index finger. If fit for picking, the stem will let loose from the fruit spur without breaking. The pear must be picked before ripening, in order to get best quality in flavour and lusciousness. To exactly determine when a variety of pears is ready for harvesting, the grower must judge by the size the fruit has attained and by the ripening of a few premature ones that are always present in a tree. The seed may also be turning at the time. It is recommended to make several pickings, thereby getting a more even size of fruit, resulting in a better average from the orchard. The same careful handling applies to pears as to apples.

Sizing.

Commercially, pears are sized in four different sizes—viz., $2\frac{3}{4}$ -inch, $2\frac{1}{2}$ -inch, $2\frac{1}{4}$ -inch, and 2-inch. In determining the sizes of this fruit it is measured from cheek to cheek, and not from stem to calix. Persons sizing should use rings or wooden gauges cut to the above sizes, remembering that pears going through the 3-inch ring and remaining on the $2\frac{3}{4}$ -inch ring are considered to be $2\frac{3}{4}$ -inch pears. Pears passing through the $2\frac{3}{4}$ -inch ring and remaining on the $2\frac{1}{2}$ -inch ring are included with the $2\frac{1}{2}$ size, and those dropping through $2\frac{1}{2}$ -inch rings and remaining on the $2\frac{1}{4}$ -inch ring are considered as $2\frac{1}{4}$ -inch, allowing a quarter of an inch variation, which will meet all requirements.

Packing 2—1 Pack.

Half-cases.—The writer does not recommend the packing of pears in bushel cases, because experience has proved that for shipping and cool storage purposes half-cases and trays have given best results. To pack half-cases it is recommended that the lid part of the case be at the $7\frac{1}{2}$ -inch board as shown in Fig. 13.

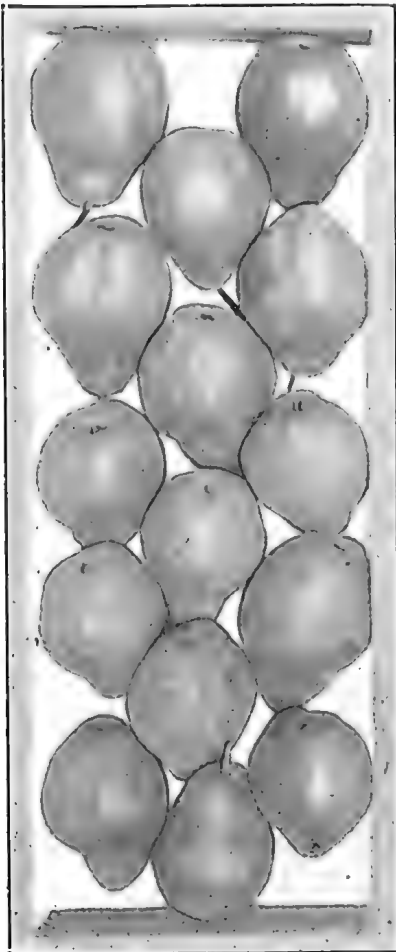


FIG. 12.

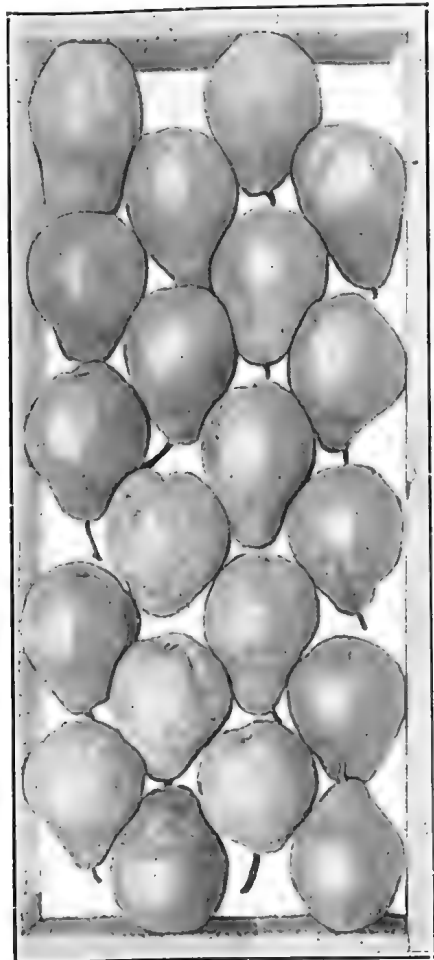


FIG. 13.

FIG. 12.—TOP VIEW OF $2\frac{1}{4}$ -INCH PEARS.
FIG. 13.—SIDE VIEW OF $2\frac{1}{4}$ -INCH PEARS.

Illustration 12 shows the first layer of $2\frac{3}{4}$ -inch pears packed in half-cases; illustration 13 shows the side view of the same size. It will be seen that $2\frac{3}{4}$ -inch pears pack 2—1 four layers to the half-case. Note that each successive layer is placed immediately in the spaces made by the layer below, and the pears finishing the layers are reversed. Illustration 14 shows first layer of $2\frac{1}{2}$ -inch pears. Illustration 15 shows side view of the same size. It will be noted that $2\frac{1}{2}$ -inch pears also pack 2—1, four layers to the half-case. The reason of this is, being $2\frac{1}{2}$ -inch, the pears pack closer together, decreasing the space between each specimen.

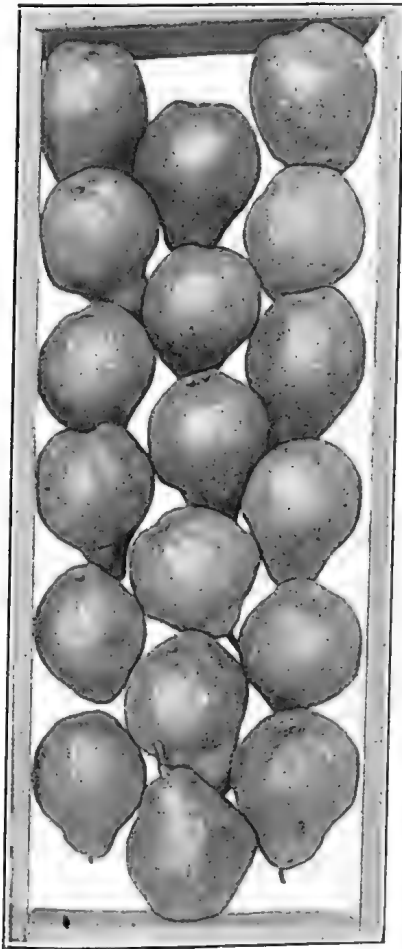


FIG. 14.

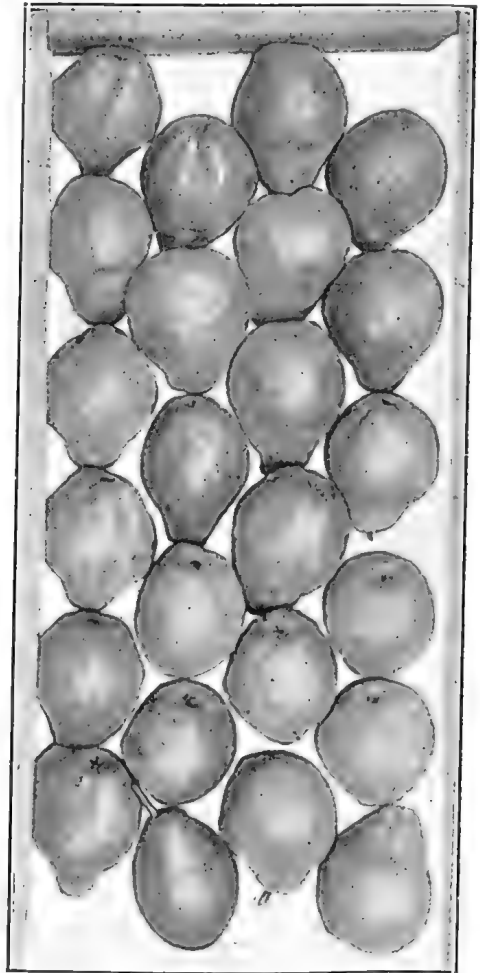


FIG. 15.

FIG. 14.—TOP VIEW OF $2\frac{1}{2}$ -INCH PEARS.

FIG. 15.—SIDE VIEW OF $2\frac{1}{2}$ -INCH PEARS.

2—2 Pack. Half-case Packing.

Half-cases.—The 2—2 pack is used for $2\frac{1}{4}$ -inch and 2-inch pears. Illustrations 16 and 17 show the first layer and side view, respectively. It will be noted that five layers fill the half-case; always remembering to reverse the last two pears in each layer. The reversing is essential to produce a firm pack.

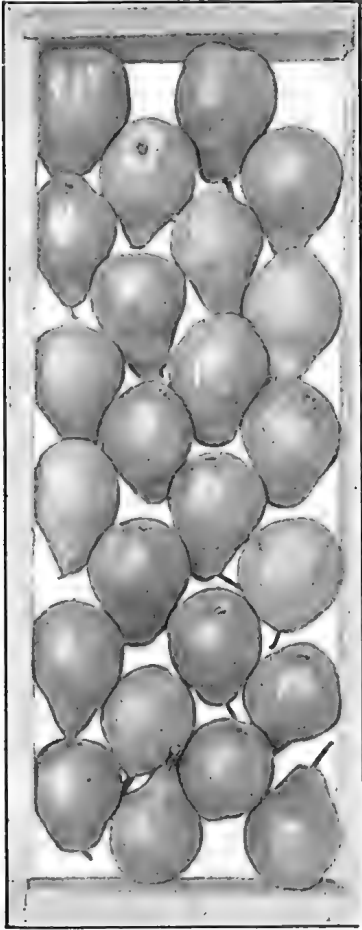


FIG. 16.

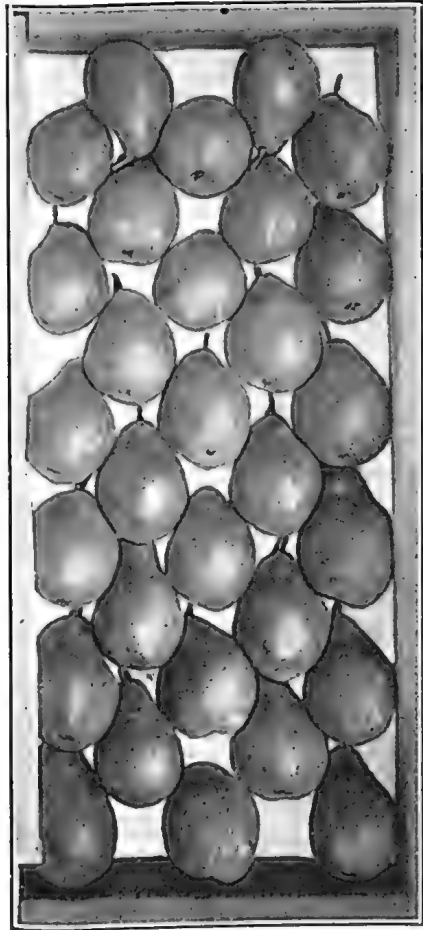


FIG. 17.

FIG. 16.—TOP VIEW OF $2\frac{1}{4}$ -INCH PEARS.

FIG. 17.—SIDE VIEW OF $2\frac{1}{4}$ -INCH PEARS.

Packers will have considerable difficulty in packing $2\frac{1}{4}$ -inch pears if the opening of the half-case is the same as the bushel. But make your half-cases as shown in Fig. 16, follow the instructions, and little difficulty will be experienced. Again reverse the last two pears in each layer. Take care not to break the stem end, and eliminate stemless specimens, especially for cool storage and distant markets. Size pears before commencing to pack, and do not roll the fruit about on the packing table, but pack from case to case.

Trays.

It has been found that for export to overseas markets the tray is preferable as a package for pears. There are several reasons for this—(1) The fruit carries better, (2) it facilitates packing, (3) shows fruit to better advantage, (4) eliminates much bruising at the stem end. This part of the pear ripens first and requires very careful handling.

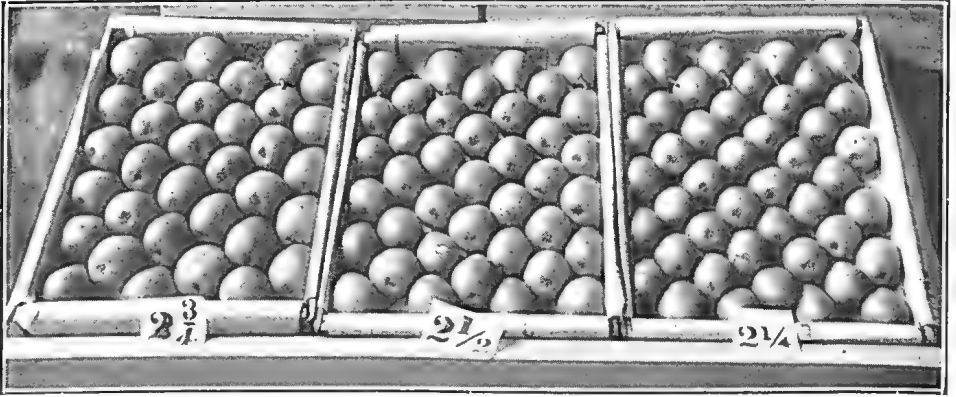


FIG. 18.—SHOWING 2 $\frac{3}{4}$ -INCH, 2 $\frac{1}{2}$ -INCH, 2 $\frac{1}{4}$ -INCH PEARS PACKED IN TRAYS. AS THERE IS ONLY ONE LAYER, THE ILLUSTRATION IS SELF-EXPLANATORY.

PEACHES.

The greatly increased production of peaches, with the resulting keener competition on the markets, makes it more necessary than ever that every commercial grower of this product should produce fruit of fine quality, eliminate undesirable varieties, pick carefully, size and pack correctly, to enable the fruit to carry to the markets in the best possible condition. As in the case of all soft fruits, peaches must be handled rapidly and very carefully throughout harvesting, sizing, and packing operations.

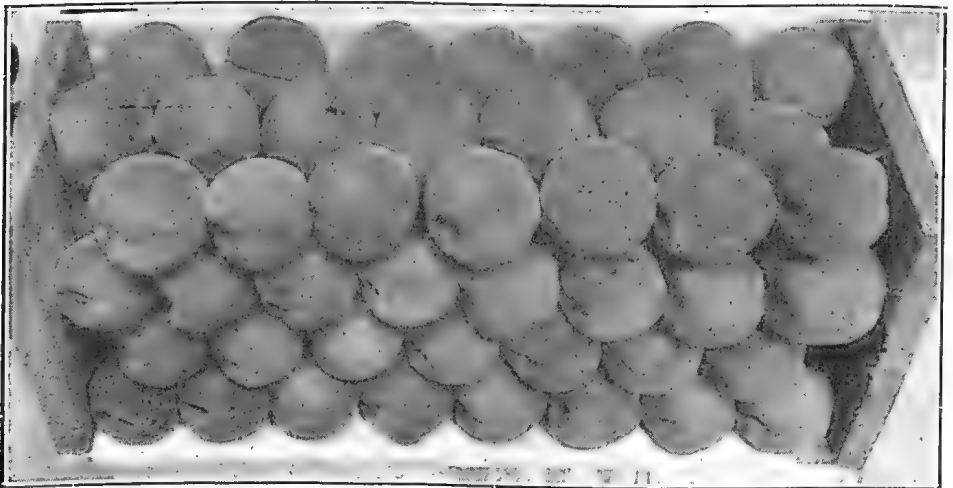


FIG. 19.—SIDE AND TOP VIEW OF WELL-PACKED CASE OF 2 $\frac{3}{4}$ -INCH PEACHES.

Picking.

The time for picking the peach depends largely upon the distance of the markets. Local markets will allow the peach to ripen further than when it is intended to be shipped in closed vans and in transit a number of days. Peaches are often allowed to ripen and colour too much before being picked, resulting in early decay and excessive over-ripeness. However, the peach should have attained full size and started slightly to colour at the time of picking. When picking peaches extreme care should be taken to handle the fruits without squeezing or unnecessary pressure. With a side twist of the hand remove the peaches from the branches without injuring the flesh. The fruit should not be dropped into picking baskets, but each specimen should be laid gently and quickly in the bag or basket, great care being taken when emptying the contents of bag or basket into the orchard box.

Sizing.

When sizing peaches do not empty the fruit on to a packing table or bench, but instead size direct from the orchard box into shipping cases. The packer can then pack direct from case to case, eliminating rolling

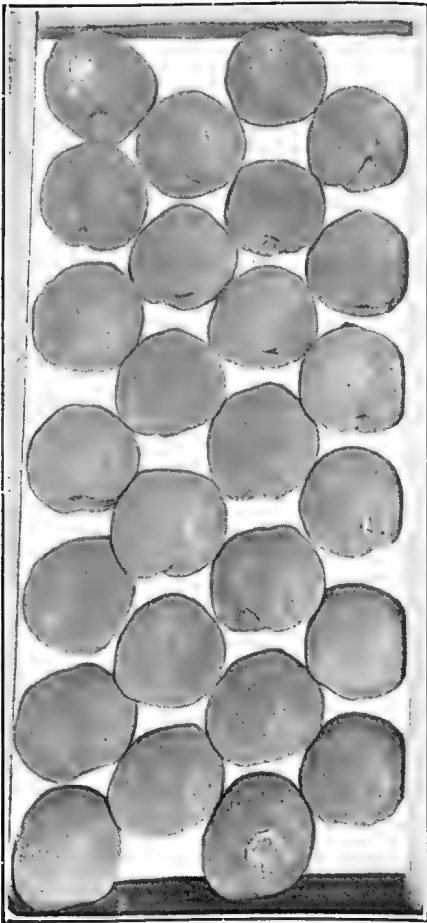


FIG. 20.

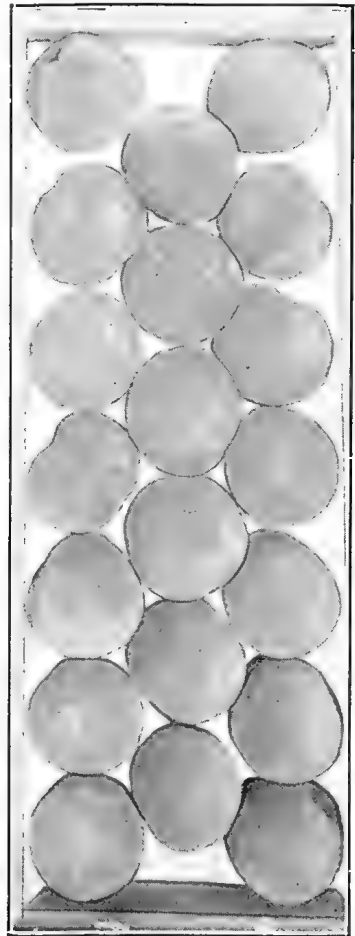


FIG. 21.

FIG. 20.—SIDE VIEW OF 2 $\frac{1}{4}$ -INCH PEACHES.

FIG. 21.—TOP VIEW OF 2 $\frac{1}{4}$ -INCH PEACHES.

of the fruit about on the benches and searching for the various sizes. If the peach is sized into $2\frac{3}{4}$ -inch, $2\frac{1}{2}$ -inch, $2\frac{1}{4}$ -inch, and 2-inch sizes they will meet all requirements.

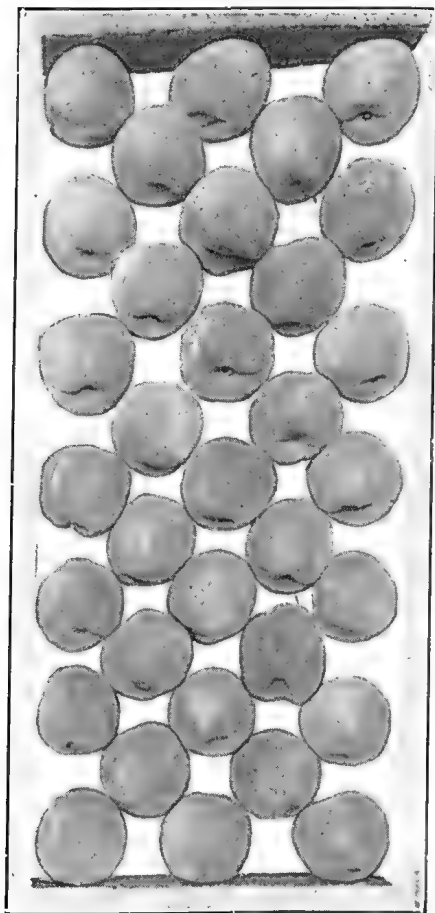


FIG. 22.

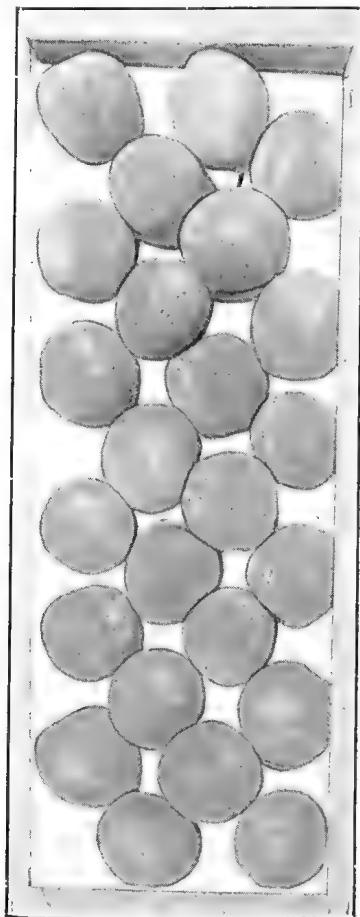


FIG. 23.

FIG. 22.—SIDE VIEW OF $2\frac{1}{4}$ -INCH PEACHES.

FIG. 23.—TOP VIEW OF $2\frac{1}{4}$ -INCH PEACHES.

Packing.

Retailers and shopkeepers desire that the projecting portion of the peach—that is, the part which ripens and colours first, should not be bruised. If peaches are displayed in shop windows with this part disfigured they look unsightly and decay early and are a loss to the retailer, which is indirectly a loss to the grower. Therefore, it is necessary to preserve this part of the peach by packing in such a way that it does not come in contact with the sides of the case. Illustration 19 shows part of peach touching the side of the case. The stem end is considered

to be the hardest part of the peach, and illustration Fig. 19 shows this part of the fruit packed towards the side. The great essential, however, for successful packing is correct sizing.

Illustration 20 shows top view of $2\frac{3}{4}$ -inch peaches.

Illustration 22 shows top view of $2\frac{1}{2}$ -inch peaches.

Illustration 25 shows top view of $2\frac{1}{4}$ -inch peaches.

Illustration 21 shows side view of $2\frac{3}{4}$ -inch peaches.

Illustration 23 shows side view of $2\frac{1}{2}$ -inch peaches.

Illustration 24 shows side view of $2\frac{1}{4}$ -inch peaches.

Take particular care to pack each successive layer in the spaces of the former layer.

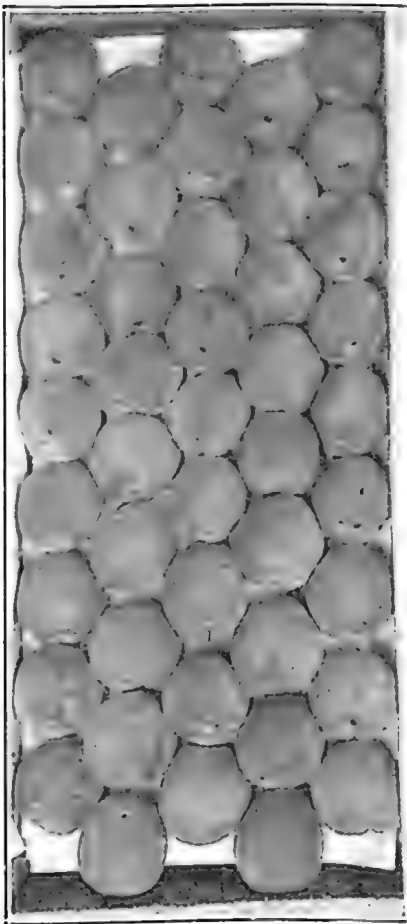


FIG. 24.

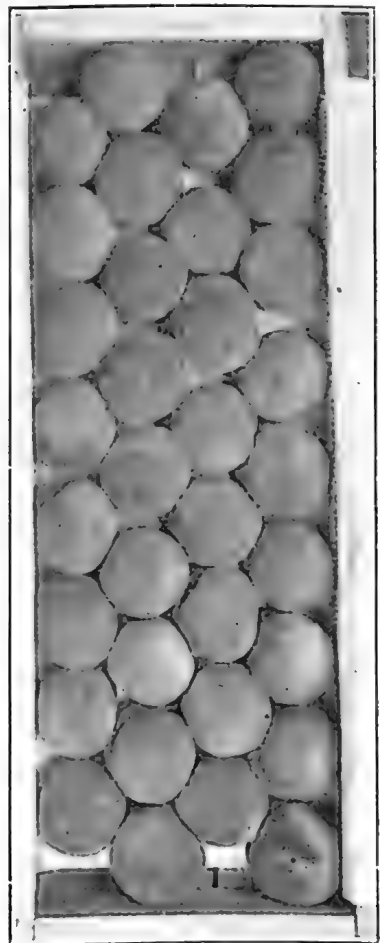


FIG. 25.

FIG. 24.—SIDE VIEW OF $2\frac{1}{4}$ -INCH PEACHES

FIG. 25.—TOP VIEW OF $2\frac{1}{4}$ -INCH PEACHES.

TOMATOES.

Much can be said in favour of sizing and packing tomatoes, especially when they are required for shipping to local or distant markets. It is of great importance that the tomatoes in each case be of uniform size, for large and small tomatoes packed together constitute an undesirable package. It not only makes a very poor appearance on the markets, but is disliked by retail buyers because of the fact that the tomatoes contained therein cannot all be sold at the one price. Restaurants, hotels, railway dining-cars, and similar institutions require tomatoes of even size, as the *trade demands* make it desirable for them to serve every customer with equal portions. The tomato-grower who wishes to establish a reputation for himself should size and pack carefully.

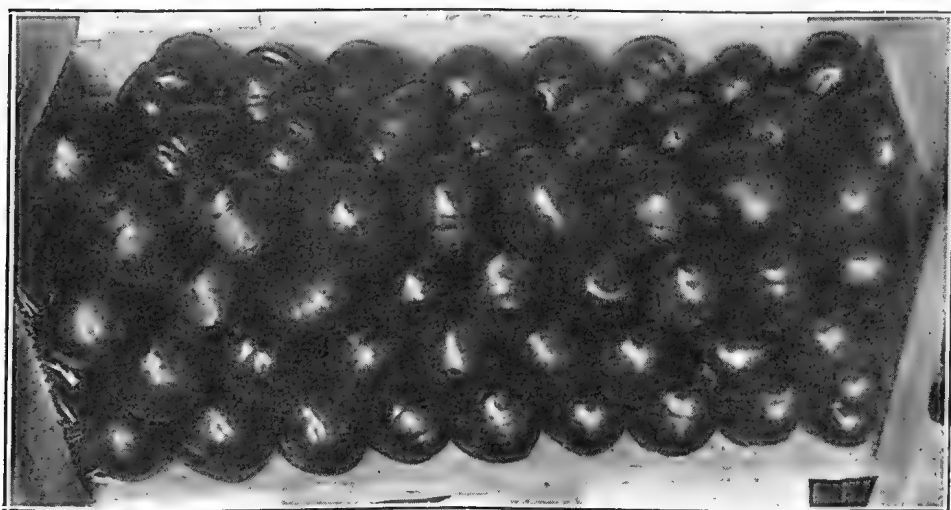


FIG. 26.—SHOWING SIDE AND TOP VIEW OF WELL-PACKED CASE OF 2 $\frac{1}{4}$ -INCH TOMATOES.

Picking.

When tomatoes are to be forwarded to the markets by rail or steamer they should be picked when they show a yellowish colour; for immediate sale they should be fairly ripe. Careful handling of this product is essential. Each vine should receive equal attention in order to prevent some of the fruit becoming over-ripe. Tomatoes should be marketed as soon as possible after picking.

Sizing.

This operation is carried out on the same lines as for peaches and apples, with the same variation of a quarter of an inch. Tomatoes over the size of 2-inch diameter should be sent to the cannery or factory. Sized to 2 $\frac{3}{4}$ -inch, 2 $\frac{1}{2}$ -inch, and 2 $\frac{1}{4}$ -inch, they will suit the trade admirably.

Do not empty or roll tomatoes about on the benches. It is much quicker and gentler to size direct from the orchard box or basket into the marketing cases.

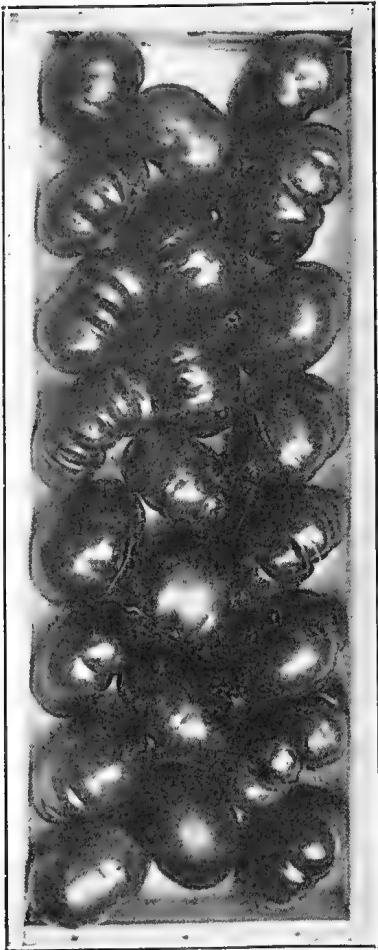


FIG. 27.

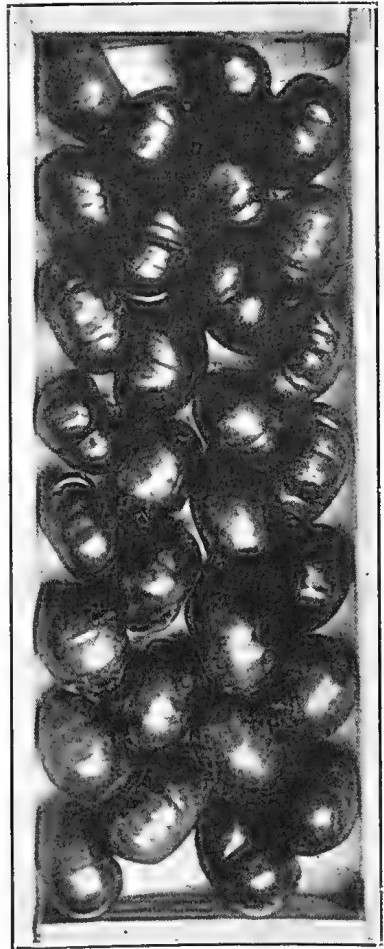


FIG. 28.

FIG. 27.—SIDE VIEW OF $2\frac{3}{4}$ -INCH TOMATOES.

FIG. 28.—TOP VIEW OF $2\frac{3}{4}$ -INCH TOMATOES.

Packing.

Tomatoes are packed similarly to apples—that is, as far as the placing of the fruit is concerned. Fig. 27 shows first layer of $2\frac{3}{4}$ -inch with tomatoes packed 2—1, four layers to the half-case. Fig. 28 shows $2\frac{1}{2}$ -inch tomatoes packed 2—2, four layers to the half-case; $2\frac{1}{4}$ -inch tomatoes pack 2—2, five layers to the half-case; the placing of this size is more on the angle.

PLUMS.

The illustration Fig. 28 shows plums packed in trays and half-cases. The trays are found to be the most suitable for the carriage of this fruit, half-cases being too bulky. The inside measurements of the trays are 18 by 2 $\frac{7}{8}$ by 14 $\frac{1}{4}$. (This size tray is also used for pears.) Large plums, such as Grand Duke, Presidents, &c., packed on their ends make a fine display, one layer to each tray; while smaller plums (Greengages, &c.) pack two layers to the tray. The illustrations are self-explanatory. It is not recommended to wrap plums for nearby markets, but for cool store and distant markets we have found it advisable to wrap.

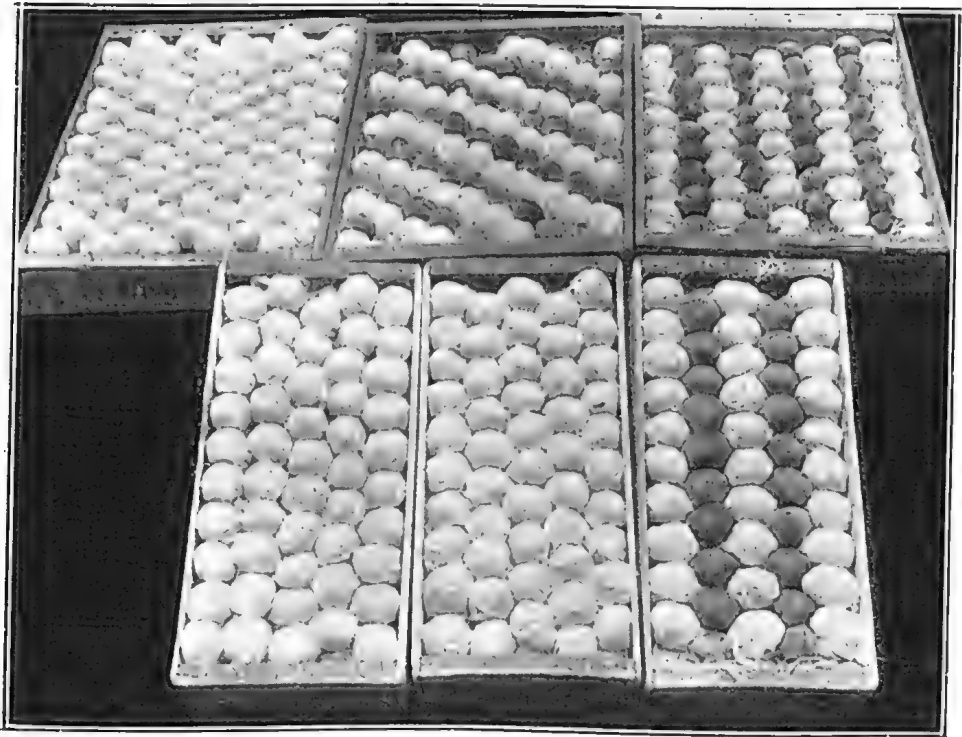


FIG. 29.—PLUMS PACKED IN SINGLE-LAYER TRAYS AND IN HALF-BUSHEL CASES—
SOME WRAPPED, OTHERS UNWRAPPED—AS SHIPPED FROM TASMANIA TO ENGLAND,
MARCH, 1922.

COTTON PESTS IN NORTH QUEENSLAND.

Mr. B. L. Jardine, Somerset Copra Plantation, North Queensland, writes:—In respect to the recent report made available by the Minister for Agriculture (Hon. W. N. Gillies) under the heading "Cotton Pests Occurring on the Darling Downs" ("Q.A.J.," December, 1922), I beg to report the following:—In this locality the same trouble was experienced a short while back, and for a time the position was very grave, as complete destruction of the crop was threatened. Immediate investigations, with the object of minimising further destruction, were made and, notwithstanding the early discovery and quick arrest of the trouble, considerable damage was done to the rest of the young plants, the nature of which resembled that described in the notes referred to.

Soon after the planting of the seed, between the third and fourth day, the first evidence of some nocturnal incursion was noted. At this period the young plants were commencing to show through the earth and many were found to have been severed below the bursting seed cells and leaves, with no further disfigurement to the dismembered parts. Day after day the trouble continued with increasing intensity until the surviving plants had attained the height of 5 or 6 in. Then the trouble vanished as abruptly as it came. The gaps in the rows were replanted, only to meet with a heavier percentage of loss. An examination made of the planted areas in the early hours of the morning revealed the cause of the destruction. A large reddish black ant $\frac{3}{4}$ in. long, armed with powerful saw-like mandibles, its forepart not unlike the stag beetle, was attacking both seeds and young shoots with great avidity. It was also noticed that rodents had developed a keen taste for the seed and proved a nuisance equally as great.

Habits.—The ant is nocturnal in habit and lives in sub-surface communities in cavities connected with the open by a passage or tunnel. By day its movements are sluggish and are confined to the vicinity of its colony; but at night it becomes very active, and, like most insects of its class, has no particular preference to any one fodder plant, and is therefore a ready victim to poison.

Remedies.—Soon after the land has been cultivated a search for their colonies should be made. These may be located easily by the newly powdered earth thrown up. (1) Insert caustic soda in tunnels, then add water; (2) poison-arsenic, soda, and syrup; (3) medicate seed before planting with ten drops of lysol or phenyle to pint of water; allow the seed to stand in the solution for an hour or so before planting. This will be found very effective. (4) No. 3 in addition to poisoning as an effective precaution against rats.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS,
Assistant Botanist.

No 20.

The Rose-leaf or Pink Marara, *Aekama paniculata*, is a very common tree on Roberts's Plateau and on the Eungella Range, further north. Our pictures show typical specimens of the species. The barrel is very often flanged at the base. The bark is light or yellowish grey in colour and often wrinkled with warts disposed in rows or in the wrinkles; when cut it is pale brown or pinkish, becoming paler inwards. The surface of the sapwood is white when the bark is peeled off. The generic name *Aekama* originated from the Maori name "Makamaka" for a closely allied tree, *Aekama rosæfolia*, growing in the North Island of New Zealand. Our species is confined to Australia and is found in rain forests as far south as the Hawkesbury River in New South Wales (C. Moore), and as far north as the Eungella Range, westward of Mackay in Queensland. The Northern Rose-leaf Marara, *Aekama quadrivalvis*, which is found at Atherton and Rockingham Bay, resembles the southern species in many ways. Its chief difference is in the possession of 4 (rarely 3 or 5) cells in the capsules instead of the 2 cells of the more southern species.



Photo, by the Authors.

PLATE 93.—THE ROSE-LEAF MARARA (*Ackama paniculata*).
A tree on Roberts Plateau, National Park.



Photo : Dept. Agriculture and Stock.]

PLATE 94.—THE ROSE-LEAF MARARA.

A.—Flowering twig.

B.—Twig bearing capsules.

THE WORLD'S PRODUCTION OF TEXTILE CROPS.

The International Institute of Agriculture at Rome has published an interesting report on the world production of textile crops in 1922, as compared with pre-war production. In summarising its findings, it places the aggregate cotton production of a group of countries responsible for about 85 per cent. of the world's total production at 73,000,000 centals, or a decrease for 1922 of approximately 16 per cent., as compared with the corresponding pre-war average of 87,000,000 centals, although showing an increase over the production of 1921-22, which was 59,000,000 centals. The production for 1921-22 was, however, exceptionally poor, due in a great part to the deficient yield of the United States, which was the lowest recorded for twenty-five years. The cultivated area under cotton in 1922-23 (56,000,000 acres) exceeded that cultivated the previous season by about 12 per cent., and was only 4 per cent. below the pre-war average cultivation. The yields per acre in 1922-23 even cannot be looked upon as favourable, a yield of only 1.3 centals per acre being obtained, as compared with an average of 1.5 centals for the five years' period, 1909 to 1913.

STUD STOCK STUDIES.

Best Breeds of Pigs for Queensland Conditions.*

Tamworths.

Authorities claim this breed is directly descended from the wild pigs of Europe, and that it has been domesticated in the Midland Counties of England for centuries, and the manner in which it gathered its food there, no doubt, has had a good deal to do with perpetuating the long, straight snout and razor-back appearance characteristic of the breed. Latterly, a limited improvement has been effected in the body conformation of the best specimens of Tamworths, but careful selection is necessary to maintain type.

The chief characteristics associated with the improved Tamworth are:—

A distinctive whole-red coating of hair; a long narrow head and straight snout; fine, rigid ears with a forward inclination; rather fine, lengthy neck; fine shoulders; long, narrow, slightly arched back, with strong loin; lengthy, meaty hindquarters which, with a well set-on tail, finishes off a body which must have good depth, and be supported by strong, straight, evenly placed long legs, with flat bone.

The Tamworth is recognised as a gross feeder; it possesses a good constitution, and is prolific, the sows being good mothers and free sucklers.

Farmers with an eye for the neat, symmetrical outline of the Berkshire and Mid. Yorkshire, are not attracted by the lengthy snout, narrow head and body, and the lean-looking appearance of the Tamworth. These characteristics will naturally keep the latter, as a distinctive breed, from gaining universal favour.

Poland-China.

This breed is a composite one, evolved in the hog-raising States of U.S.A. The chief characteristics of the breed are as follows:—

Colour, black, with white markings on face and legs; of medium size; short and compact; thickly fleshed; deep bodied, and set on short, evenly placed legs. The head is short and broad; short face with a distinct taper from eyes to point of nose; ears slightly drooping; full jaw; neck, full and short; shoulders, full and rounded on top; ribs, well sprung and deep; body, even and deep, with good underline, showing full, thick flanks; full, deep, fleshy hams.

Authorities agree as to the docility of this breed of pig and its ability to rapidly lay on a wealth of flesh and fat; the tendency, however, is for the animals to become too fat, which has earned for them the designation of "lard" hogs.

It is not considered that the Poland-China enjoys any advantages over the Berkshire for use in this State, but rather that it is inferior to the former in size, length of body, and prolificness.

*From "Pig Raising in Queensland" (E. Graham and H. C. Quodling), Department of Agriculture and Stock, Queensland, October, 1922.

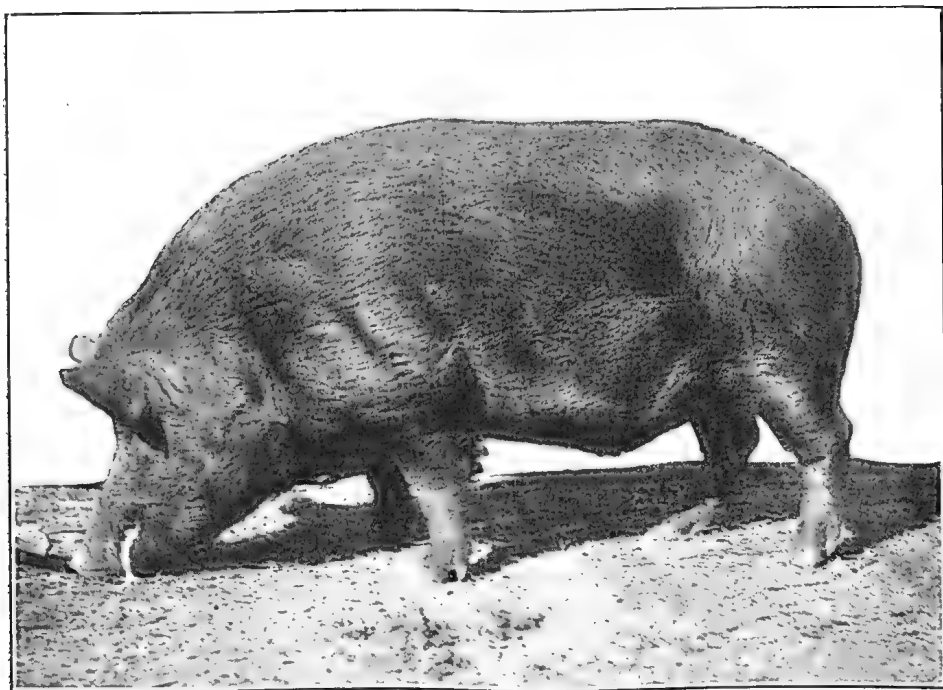


PLATE 93.—TAMWORTH BOAR.

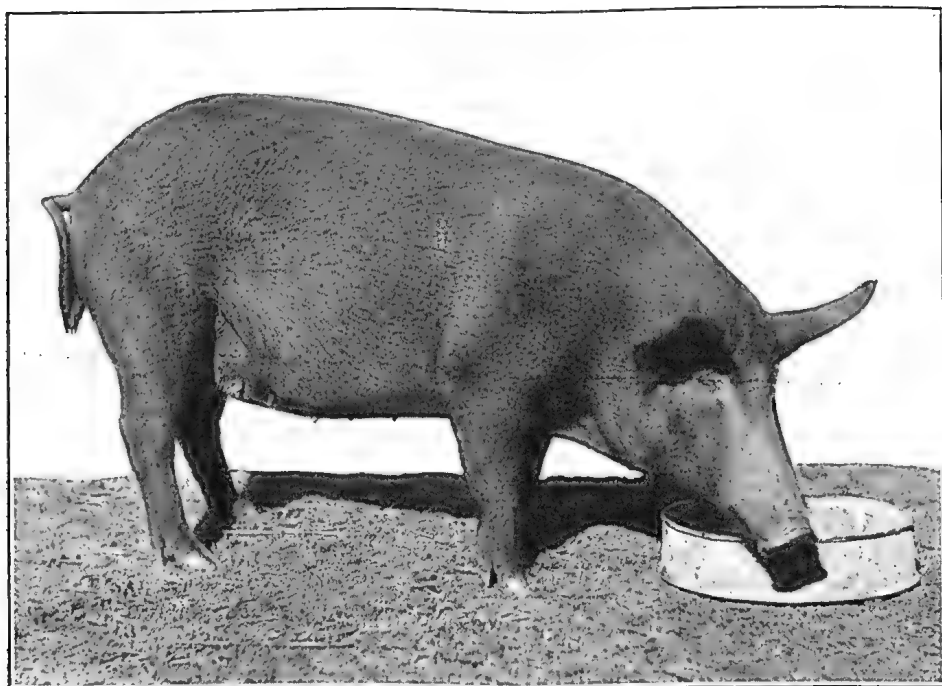


PLATE 93.—A YOUNG TAMWORTH SOW.

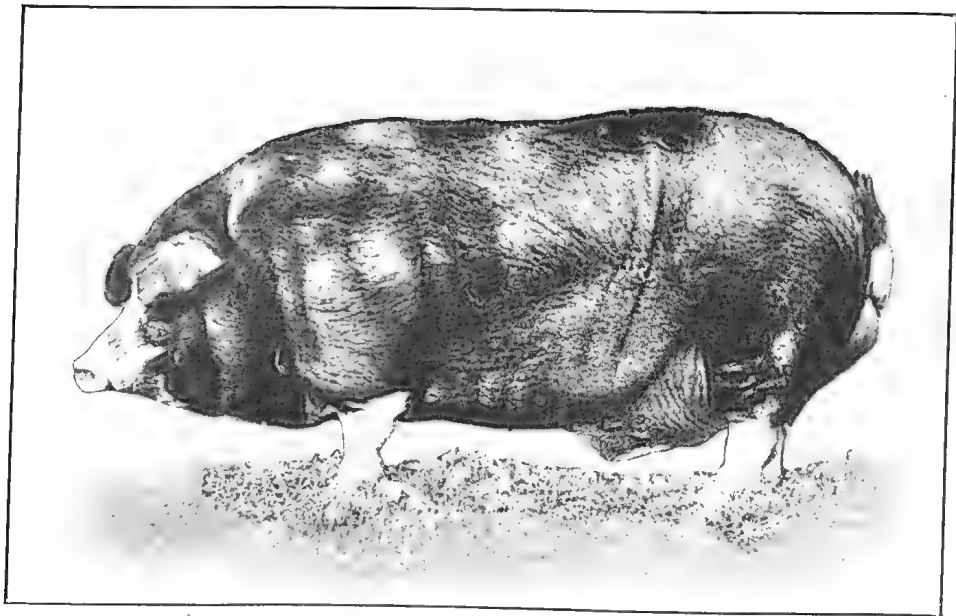


PLATE 97.—POLAND-CHINA BOAR.

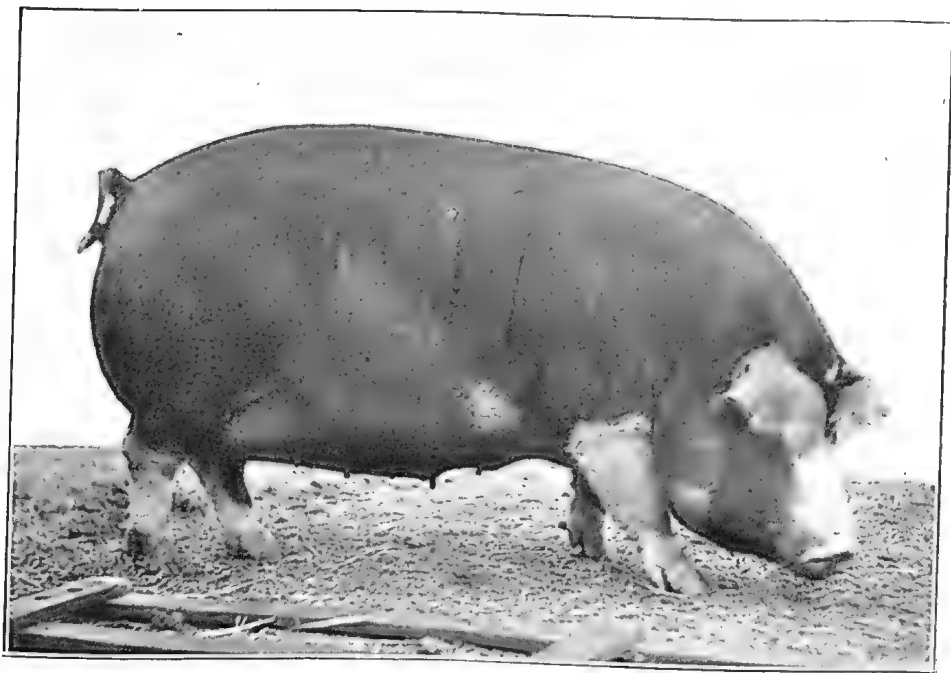


PLATE 98.—POLAND-CHINA SOW

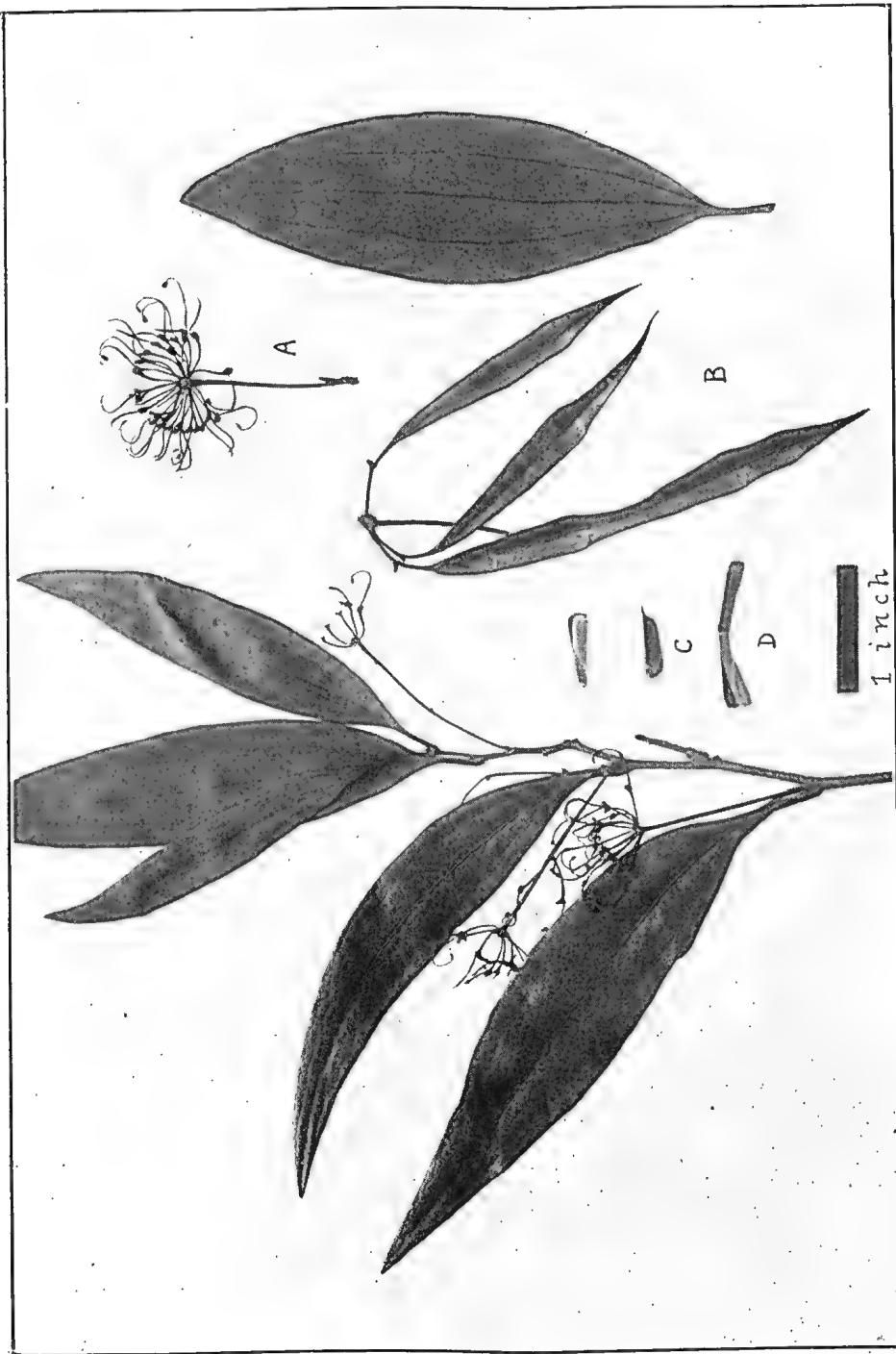


Photo: Dept. Agriculture and Stock.]

PLATE 99.—THE SCRUB BEEFWOOD.

(Omitted from April Journal.)

A.—Inflorescence.

B.—Seed Vessels.

C.—Seeds.

D.—Showing a seed inserted between two lamellae.

IMPROVING THE QUALITY AND PRODUCTIVENESS OF FRUIT AND FRUIT TREES.

By ALBERT H. BENSON, M.R.A.C., Director of Fruit Culture.

In the February number of the "Queensland Agricultural Journal" for 1898 an article dealing with the "Propagation of Fruit Trees," and contributed by the writer, was published. The article in question was a reproduction of a paper read at the meeting of the Australasian Association for the Advancement of Science, held in Sydney in January, 1898. After twenty-five years I see no reason to alter my opinions, but am again submitting the advice I then gave. I have no hesitation in saying that had this advice been acted upon the fruitgrowing industry of Australia would be on a more satisfactory basis than it is to-day, and the many diseased, useless, inferior, and unprofitable trees now cumbering the orchards in every State of the Commonwealth would not have been propagated, let alone planted. Unfortunately, the propagation of inferior varieties still continues, and the paramount importance of bud and stock selection is not realised; buds or grafts being frequently procured from the most accessible source irrespective of the vigour, health, and productiveness of the tree from which the scions are obtained or the vigour of the stock upon which the scions are worked. To-day there are many thousands of apple, citrus, and other fruits growing on the wrong stocks; that are lacking in vigour and that will never make a satisfactory or profitable tree capable of producing regular crops of the best quality. This is a very serious matter, for, on account of the enormous increase in the production of fruit, not only in Australia but elsewhere, there is a constantly increasing difficulty in obtaining profitable markets and there is practically no market for inferior lines.

The planting of inferior and non-productive varieties of fruit is inimical to the industry, and unless it is stopped will lead eventually to serious loss. American authorities recognise this, and for some years have been carrying out exhaustive tests to prove the value of bud selection, with the result that the trees produced by such selection are regular bearers of the highest quality fruit, thus confirming my original contention in every respect.

American nurserymen recognise the importance of bud selection and many are only using the wood taken from trees having a record for quality and quantity productiveness; in brief, from proved "stud" trees, so that purchasers of the trees worked therefrom are practically certain of having an orchard in which the trees can be depended upon to yield a satisfactory return of high quality fruit, instead of one containing a number of trees bearing fruit of very variable quality and very uncertain in the matter of production; in fact, an orchard such as is altogether too common in Queensland. It is fully time that our nurserymen made a serious attempt to improve the stamina and quality of the trees they propagate, so that when planted out permanently they are able to grow into vigorous trees possessing a good root system and capable of yielding a maximum crop of the highest quality fruit. This can only be brought about by the exercise of the greatest care in the selection of the stocks and scions—in brief, by systematic propagation, or, to use a stockman's term, "stud breeding."

Fruitgrowers have the remedy in their own hands, as once they let nurserymen know that they will only purchase trees of guaranteed quality worked from trees of proved excellence, they will get what they ask for, but as long as they accept anything offered to them by nurserymen they cannot expect much improvement.

Following is an extract from the article referred to ("Propagation of Fruit Trees," "Q.A.J.," February, 1898) and which holds as good to-day as when first written:—

The Selection of the Stock.

This is a matter of vital importance, and one that seldom receives the careful consideration it should, as not only should the stock be chosen that assimilates most readily with the scion, and thus forms a complete and perfect union with it, but it should also be the one that is best adapted to the soil in which the tree is to be permanently planted; and in addition to these qualifications, there is one other of even greater importance, and that is the constitutional vigour of the stock itself.

I am strongly in favour of exercising the greatest possible care in the selection of stocks possessing strong constitutions, as it is on the constitution of the stock that the future vigour, freedom from disease, and length of life of the tree largely depends. Seedlings make the best of all stocks—not seedlings raised indiscriminately, but seedlings that are grown from carefully selected seeds that have been obtained from vigorous healthy trees that are known to be constitutionally robust, as the

seedlings produced from such seeds are more likely to produce healthy vigorous stocks than those grown from seeds that have been taken indiscriminately from any fruits that are available. Stocks are often raised from cuttings or by means of root-grafting, but such never possess as good a root-system as the seedling, nor have they the same vitality or inherent vigour. But when it is desirable to produce stocks by these means, every care should be taken to obtain the cuttings from strong-growing, healthy, vigorous trees. Be particularly careful to obtain both seeds and cuttings from healthy trees, as many of the most troublesome diseases of fruit trees are transmitted from parent to offspring, especially in the case of citrus and stone fruits. These remarks do not refer to any particular variety of fruit, but to all fruits, as, no matter what kind of fruit you are propagating, if you wish to maintain a high standard of excellence, you must use selected stocks, and these stocks must be selected in the manner I have just described.

Selection of Scion.

In order to produce the best fruit (and by the best fruit I mean that which is of most value commercially, and which pays the grower best), it is absolutely necessary that the same care shall be exercised in the propagation of the tree as the successful breeder of stock takes for the raising of horses, cattle, sheep, or other live stock; and just as the successful breeding of stock depends on the careful selection of the sire and dam, so the successful propagation of the best fruit depends on the careful selection of the stock and scion.

One of the best known laws of Nature, both as regards the propagation of animals or plants, is that like produces like, and that by a careful selection of and propagating only from the best that both animals and plants become improved. This being so, it therefore stands to reason that the greater the care that is taken in the selection of the scion, be it bud, graft, or cutting, the greater the chance that the tree produced from such scion will produce fruit of equal quality to the parent tree from which the scion was obtained, and, if the stock has been selected as well, then that the tree resulting from the union of such stock and scion may be superior to the parent tree.

As the scion, when united with the stock, becomes eventually the entire fruit-producing portion of the tree, it is impossible to over-estimate the importance of selecting the best scions—for as the scion is so will the tree be. This is a point that is often overlooked by Australian propagators, as in many instances the only care that is taken is to see that the scion is of the desired variety that it is wished to propagate, irrespective of the source from which the scion has been obtained; and this, in my opinion, is largely the cause of the deterioration that is taking place in many of our standard varieties of fruits, especially those of the Citrus family.

Thousands of fruit trees of various kinds are annually propagated from scions that are more or less valueless, as they lack one or more of the following qualifications, which should always be taken into consideration when selecting the scion:—

Always select your scions from a perfectly healthy tree, as many diseases are transmitted by the scion.

Always select your scions from a tree that produces heavy crops of the best fruit.

Always select your scions from trees that are good growers and that possess a vigorous constitution. Never select a scion from any tree that is poor in any way—either a poor or uncertain bearer, a poor, uneven, or weakly grower, that is subject to any diseases that are directly transmitted, such as gum, curl-leaf of the peach, or small leaf of the lemon, or that is badly attacked by any scale insect or fungus—as such trees are usually constitutionally weak, for the weaker the constitution of the tree the more liable it is to disease. As to the scion itself, if a graft, see that the wood is properly matured, or, if a bud, then that the bud is full—viz., properly developed—as immature grafts or buds rarely produce vigorous trees.

One of the great questions the Australian fruitgrower has to deal with at present is to find a market for a large quantity of inferior and medium quality fruits, but, despite this fact, nurserymen are annually propagating thousands of trees of absolutely worthless varieties—trees which when they come into bearing will only produce fruit of inferior quality; and instead of gradually diminishing the output of rubbish, and thus relieving our markets of this unsaleable fruit, our growers continue to plant trees for the produce of which there is no demand, nor is there any chance of their being any, as throughout the world the demand is for first-class fruit, no matter whether it is fresh, dried, canned, or otherwise preserved.

It is therefore to the interest of every fruitgrower in Australia to obtain and plant out only the very best trees; and to obtain the very best trees, it is essential that only the best varieties be propagated, and that the care I recommend as necessary should be taken in the selection of the stocks and scions that are to produce these trees.

The Development of New and the Improvement of Existing Varieties of Fruit.

With the exception of selecting chance seedlings that have shown some special qualifications, such as earliness, productiveness, lateness, or freedom from disease, and propagating the same by budding or grafting, no systematic attempt has been made to produce fruits that are especially adapted to Australian conditions, or even to systematically improve the existing varieties of fruits. In my opinion, this is a matter of such importance that it should be made an especial study by the various Departments of Agriculture throughout Australasia. I am confident that we can produce fruits that will be more suitable to our conditions, and that will be better adapted for the markets for which they are grown—be they local, interstate, or foreign—than those that are being commonly grown at present. California owes her position, as the premier fruit-producing country on earth, to the fact that her growers have developed types of fruit that are especially adapted to her conditions and to the markets which she supplies; and that she has grown these fruits only in such districts as are most suitable to the development of each individual variety. Here, on the other hand, our growers have done little if anything towards the development of special types; and as to their confining their attention to the variety or varieties of fruits that are best adapted to their individual soil or climate, it is often one of the last things they have thought of, their orchards being more often conspicuous for the number rather than for the excellence of the varieties grown.

In addition to selection, there is the important question of developing new varieties of hybridisation, and this particular work opens up such a wide field for experiment that good results can only be achieved as the outcome of many years of extremely careful work, so that it is a matter entirely outside the scope of the ordinary propagator or fruitgrower, but is the province of a specialist such as Luther Burbank, of Santa Rosa, California. This is a matter that belongs by right to our Agricultural Departments, as it is more a public than a private question, for, no matter how skilled the operator may be, the production of a new variety possessing distinctly valuable qualities, not possessed by any existing variety, is not accomplished more than once in many thousands of experiments. Still when such a hybrid has been produced it is a great acquisition to the fruit industry, and of more or less commercial value to it.

There is, as I have before stated, a wide field for conducting experiments in the hybridisation of fruits, as we have many varieties which, though of especial merit in some particular, are yet of no commercial value owing to some other cause. Thus a tree may produce a fruit of exceptional quality which it is extremely desirable to have in quantity, but it may be either a very poor bearer, a stunted weakly grower, or very liable to disease; so that if a hybrid can be produced possessing the exceptional qualities of the original variety without its drawbacks, it is a decided gain. Or, to take another example, we have a fruit that possesses every good quality except that it is a bad keeper and shipper, and we cross it with a fruit that is an exceptionally good keeper and shipper, and the resulting hybrid possesses the good qualities of both parents. Thus we have again produced a fruit that is a decided gain and of commercial value to the country producing it.

The development of new varieties specially adapted to Australian conditions can only be achieved by systematic hybridisation, but the existing varieties of fruits may be improved by careful selection.

In conclusion, I may state that I have written these few notes on the Propagation of Fruit Trees in the hope of drawing attention to what I have felt for some time—viz., the necessity for our producing nothing but the best and for stopping the propagation of the large number of worthless varieties of fruits of all kinds that are always more or less of a drag on our markets and an injury to the fruit-growing industry of Australasia.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, APRIL, 1923.

The twentieth egg-laying competition at the Queensland Agricultural College commenced on 5th April. During the early part of the period cold and bleak winds, with light showers, prevailed, much to the detriment of the health and egg-production of the competitors, notwithstanding the fine quality of most of the birds sent to compete. A few pens were sent too young, and others contained sick birds, which would have been better left at home, as they do not improve matters for their breeders. Some of them are already in moult. The majority of the competitors look well, and should make a name for their owners. The following are the individual records:—

Competitors.	Breed.	April.	Total.
LIGHT BREEDS.			
Jas. Hutton	White Leghorns	...	100
*S. L. Grenier	Do. ....	...	94
W. A. and J. Pitkeathly	Do. ....	...	87
*C. H. Singer	Do. ....	...	86
*Rock View Poultry Farm	Do. ....	...	80
Beckley Poultry Farm	Do. ....	...	80
*J. W. Newton	Do. ....	...	80
*Oakleigh Poultry Farm	Do. ....	...	80
*J. W. Short	Do. ....	...	78
Jas. Harrington	Do. ....	...	77
*O. Goos	Do. ....	...	77
*N. A. Singer	Do. ....	...	77
*W. and G. W. Hindes	Do. ....	...	75
*R. C. J. Turner	Do. ....	...	74
*Ancona Club	Anconas ..	...	68
G. W. Rogers	White Leghorns	...	63
*Mrs. R. Hodge	Do. ....	...	59
C. Quesnell	Do. ....	...	56
*Arch. Neil	Do. ....	...	55
G. Marks	Do. ....	...	54
*G. Williams	Do. ....	...	54
F. Sparsholt	Do. ....	...	53
Hall and Chapman	Do. ....	...	53
*Mrs. L. Andersen	Do. ....	...	53
W. and G. W. Hindes	Brown Leghorns	...	52
*H. Fraser	White Leghorns	...	51
*J. M. Manson	Do. ....	...	50
Jas. Earl	Do. ....	...	46
E. Ainscough	Do. ....	...	44
*Bathurst Poultry Farm	Do. ....	...	44
*A. C. G. Wenck	Do. ....	...	37
*Mrs. E. White	Do. ....	...	31
*H. P. Clarke	Do. ....	...	30
W. Becker	Do. ....	...	30
*C. A. Goos	Do. ....	...	25
Parisian Poultry Farm	Do. ....	...	22
N. J. Nairn	Do. ....	...	16
J. Purnell	Do. ....	...	15

HEAVY BREEDS.

*W. Becker	Chinese Langshans	...	102
R. Conochie	Black Orpingtons	...	84
J. R. Douglas	Do. ....	...	81
Beckley Poultry Yards	Do. ....	...	77
*Mrs. A. E. Gallagher	Do. ....	...	73

EGG-LAYING COMPETITION—continued.

Competitors	Breed	April	Total
HEAVY BREEDS—continued.			
*Jas. Hutton	Black Orpingtons ...	73	
*R. Burns	Do.	71	
*H. M. Chaille	Do.	67	
*E. F. Dennis	Do.	63	
*Jas. Ferguson	Chinese Langshans ...	60	
*R. Holmes	Black Orpingtons ...	59	
*E. Walters	Do.	58	
Mrs. A. Kent	Do.	51	
*Jas. Potter	Do.	51	
*J. H. Jones	White Wyandottes ...	50	
W. T. Solman	Black Orpingtons ...	42	
H. B. Stephens	Do.	41	
*Parisian Poultry Farm	Do.	35	
*T. Hindley	Do.	35	
W. F. Ruhl	Do.	34	
V. J. Rye	Do.	33	
*Rev. A. McAllister	Do.	32	
W. G. Badcock	Ch. Langshans	26	
G. E. Rogers	Black Orpingtons ...	25	
*C. C. Dennis	Do.	15	
F. J. Murphy	Do.	10	
Mos. Stephens	Do.	0	
Jas. Ferguson	Rhode Island Reds ...	0	
Jas. Ferguson	Plymouth Rocks ...	0	
Total		3,554	

* indicates that the pen is being single tested.

DETAILS OF SINGLE HEN PENS.

Competition.	A.	B.	C.	D.	E.	F.	Total.
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LIGHT BREEDS.

S. L. Grenier	14	17	16	17	16	14	94
C. H. Singer	16	22	13	6	11	18	86
Rockview Poultry Farm	12	19	14	14	12	9	80
Beckley Poultry Yards	16	9	10	15	14	16	80
J. W. Newton	14	17	16	2	14	17	80
Oakleigh Poultry Farm	15	16	11	11	14	13	80
J. W. Short	13	12	12	18	16	7	78
O. Goos	11	16	16	12	8	14	77
N. A. Singer	12	20	18	12	7	8	77
W. and G. W. Hindes	6	18	10	3	18	20	75
R. C. J. Turner	4	19	16	14	4	17	74
Ancona Club	11	15	14	4	7	17	68
Mrs. R. E. Hodge	2	10	3	17	19	8	59
Arch Neil	9	4	3	12	17	10	55
Geo. Williams	15	17	0	14	0	8	54
Mrs. L. Andersen	2	14	13	17	5	2	53
H. Fraser	10	8	9	11	5	8	51
J. M. Manson	3	7	10	14	7	9	50
Bathurst Poultry Farm	3	12	10	13	0	6	44
A. C. G. Wenck	5	0	5	9	5	13	37
Mrs. E. White	5	0	13	13	0	0	31
H. P. Clarke	12	0	7	0	5	6	30
C. A. Goos	0	16	7	0	0	2	25
N. J. Nairn	6	1	4	2	2	1	16
J. Purnell	3	0	2	3	4	3	15

EGG-LAYING COMPETITION—continued.
DETAILS OF SINGLE HEN PENS—continued.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
HEAVY BREEDS.							
W. Becker	17	20	17	15	14	19	102
Mrs. A. E. Gallagher	16	18	5	16	17	1	73
Jas. Hutton	16	12	21	11	0	13	73
R. Burns	19	11	7	2	21	11	71
H. M. Chaille	8	16	18	16	0	9	67
E. F. Dennis	15	1	7	14	18	8	63
Jas. Ferguson	15	14	9	6	13	3	60
R. Holmes	13	3	19	3	12	9	59
E. Walters	18	19	0	8	6	7	58
Mrs. A. Kent	10	20	4	17	0	0	51
Jas. Potter	7	17	9	1	6	11	51
J. H. Jones	5	8	10	7	4	16	50
Parisian Poultry Farm	0	0	5	5	6	19	35
T. Hindley	7	6	9	13	0	0	35
C. C. Dennis	4	6	0	5	0	0	15

CUTHBERT POTTS, Principal.

DARLING DOWNS COMPETITION.

The Darling Downs Egg-laying Competition is being held under the auspices of the Toowoomba sub-branch of the N.U.P.B.A., conducted by Mr. Chas. E. Smith on his premises in South street, Toowoomba. During April Mr. J. Maude, of New South Wales, judged the birds in competition for keenness to type, each bird being classed as first, second, or third type, and he also selected a champion from each section, these honours going to Mr. J. H. Jones for White Leghorn, Mr. D. H. Dipple for Black Orpington, and Mr H. Becker's Langshan for any other variety. The total number of eggs laid for the month was 1,736, an average of 16.07 per bird. The following numbers represent the birds that have not yet started:—Nos. 25, 26, 36, 39, 41, 42, 55, 59, 60, in the Leghorn section; Nos. 91, 92, 98, 99, 106, 118, 123, in the Orpington section; and Nos. 61, 65, 66, 69, 70, 72, 73, 80 of the A.O.V. section. Three birds suffering from temporary ailments have recovered and have been returned to their respective pens. Following are the individual scores for April:—

WHITE LEGHORNS.

1	J. Hutton	27
13	D. Dipple	26
10	G. W. and W. Hindes	25
51	A. H. Walker	25
15	R. Cole	24
6	W. Grant	23
14	D. Dipple	23
30	W. Cummings	23
37	Parisian Poultry Yards	23
56	Enroh Pens	23
16	R. Cole	22
48	H. Hansbridge	22
53	C. A. Keon	22
2	J. Hutton	21
34	Mrs. F. Bliss	21
44	P. J. Fallon	21
54	C. A. Keon	21
21	J. W. Short	20
11	S. Chapman	19

WHITE LEGHORNS—*continued.*

20	R. W. Shaw	19
29	W. Cummings	19
4	J. H. Jones	18
7	G. Stilton	18
33	Mrs. F. Bliss	18
38	Parisian Poultry Yards	18
52	A. H. Walker	18
8	G. Stilton	17
12	S. Chapman	16
24	J. Goggins	16
47	H. Mansbridge	16
46	R. Turner	15
9	W. G. and W. Hindes	14
17	G. Lawrenson	14
19	R. W. Shaw	14
59	A. R. Petty	14
5	W. Grant	13
18	G. Lawrenson	12
49	A. R. Petty	12
57	J. W. Newton	12
22	J. W. Short	11
27	E. Wiles	10
28	E. Wiles	7
58	J. W. Newton	7
43	P. J. Fallon	6
32	Jas. Taylor	5
31	Jas. Taylor	4
23	Jas. Goggins	4
40	Vic. Brand	3
3	J. H. Jones	1
35	H. Manning	1
45	R. Turner	1

ORPINGTONS.

121	Jas. Hutton	29
88	Marville Poultry Farm	27
90	W. Wilson	26
109	D. Dipple	26
112	T. J. Carr	26
95	T. C. Ollier	25
110	D. Dipple	25
111	T. J. Carr	23
132	H. B. Stephens	23
127	E. Walters	22
103	C. F. Dennis	21
113	Ken. Macfarlane	21
115	Cliff Lavers	21
117	Mrs. L. Maund	21
120	Parisian Poultry Yards	21
129	G. Radford	21
128	E. Walters	21
114	Ken. Macfarlane	20
122	Jas. Hutton	20
84	Wombo Poultry Farm	19
108	R. Holmes	19
116	Cliff Lavers	19
131	H. B. Stephens	19

ORPINGTONS—*continued*.

86	T. J. Moloney	..	..	..	..	18
97	R. Burns	..	..	..	..	18
83	Wombo Poultry Farm	..	..	..	..	17
85	T. J. Moloney	..	..	..	..	17
89	W. Wilson	..	..	..	..	17
96	T. C. Ollier	..	..	..	..	17
107	R. Holmes	..	..	..	..	17
87	Marville Poultry Farm	..	..	..	..	16
126	E. C. Dennis	..	..	..	..	14
125	E. C. Dennis	..	..	..	..	12
94	H. Mansbridge	..	..	..	..	9
100	Mrs. G. H. Kettle	..	..	..	..	6
105	R. Rivett	..	..	..	..	6
103	G. Radford	..	..	..	..	6
93	H. Mansbridge	..	..	..	..	5
101	R. W. Shaw	..	..	..	..	5
102	R. W. Shaw	..	..	..	..	4
104	E. F. Dennis	..	..	..	..	4
119	Parisian Poultry Yards	..	..	..	..	2
124	G. E. Rogers	..	..	..	..	1

ALL OTHER VARIETIES.

76	W. Becker, Langshans	..	..	..	..	27
73	H. Dibbs, Langshans	..	..	..	..	23
64	T. J. Carr, S.W.	..	..	..	..	22
68	R. W. Shaw, B.L.	..	..	..	..	21
67	R. W. Shaw, B.L.	..	..	..	..	20
82	C. G. Warrian, Rocks	..	..	..	..	20
63	T. J. Carr, S.W.	..	..	..	..	15
71	J. W. Allatt, Silver Camp.	..	..	..	..	15
74	H. Dibbs, Langshans	..	..	..	..	9
75	W. Becker, Langshans	..	..	..	..	9
79	A. Le Pla, R.I.R.	..	..	..	..	9
62	Mrs. L. Maund, Col. W.	..	..	..	..	8
81	C. G. Warrian, Rocks	..	..	..	..	5
77	W. Paulsen, Rocks	..	..	..	..	1

THE NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION.**ALLOTMENT OF PENS, ZILLMERE COMPETITION, 1923-4.**

WHITE LEGHORNS.

Pen Nos.

1/2	Carinya Poultry Farm, Salisbury
3/4	T. H. Craig, Miriam Vale
5/6	P. J. Fallon, Brodribb street, Toowoomba
7/8	Oakleigh Poultry Farm, Sunnybank
9/10	R. C. J. Turner, Chamberlain street, Toowoomba
11/12	A. Neil, Cannon Hill
13/14	Enroh Pens, Pine street, Ipswich
15/16	W. J. Berry, Brickfield street, Lutwyche
17/18	A. W. Ward, Eskgrove street, East Brisbane
19/20	W. Witt, Villeneuve, Kilooy Line
21/22	M. F. Newberry, Kedron Brook road, Wilston
23/24	Parisian Poultry Yards, Chamberlain street, Toowoomba
25/26	E. Stephenson, Bardon Poultry Farm, Paddington

WHITE LEGHORNS—*continued*.

- 27/28 H. T. Britten, Peary street, Northgate
 29/30 G. and W. Hindes, Manly
 31/32 H. Needs, Sunnybank
 33/34 A. S. Walters, Doris street, Hill End, South Brisbane
 35/36 J. T. Webster, Halaton, Bulimba
 37/38 G. Williams, Salisbury road, Ipswich
 39/40 J. Earl, Glenlossie, Kedron Brook road, Wilston
 41/42 W. Wakefield, Soldier Settlement, Mount Gravatt
 43/44 Kelvin Poultry Farm, Kelvin Grove
 45/46 F. R. Koch, Cazna Poultry Farm, Laidley
 47/48 R. D. Chapman, Montpelier street, Newmarket
 49/50 J. Harrington, Aspley
 51/52 Kidd Bros., Zillmere
 53/54 H. Holmes, Hobart, Tasmania
 55/56 G. Baxter, Lucknow road, North Ryde, Sydney, N.S.W.
 57/58 H. Fraser, Rosewood
 59/60 G. Scaletti, Mount Druitt, N.S.W.
 61/62 Miss L. M. Dingle, Nudgee College Railway Station
 63/64 S. Lloyd, Cornwall street, Thompson Estate
 65/66 Robt. Duff, Waterworks road, Red Hill
 67/68 J. and G. Green, Alma street, Clayfield
 69/70 R. Shaw, Mayfield, Coorparoo
 71/72 W. H. Forsyth, Willoughby, N.S.W.
 73/74 A. Hodge, Kelvin Grove road, Brisbane
 75/76 W. Shaffrey, Zillmere
 77/78 W. Smith, Holmesbrook street, Grove Estate
 79/80 W. Bliss, Forest Hill
 81/82 J. E. G. Purnell, Annie street, Torwood
 83/84 L. Andersen, Skew street, Sherwood
 85/86 A. Cowley, Soldier Settlement, Enoggera

BLACK ORPINGTONS.

- 87/88 Parisian Poultry Yards, Chamberlain street, Toowoomba
 89/90 Ken Macfarlane, Box 69, Toowoomba
 91/92 Jas. Pryde, Chapel Hill, Indooroopilly
 93/94 H. B. Stephens, Box 69, Toowoomba
 95/96 Jas. Potter, Zillman road, Hendra
 97/98 W. Shaffrey, Zillmere
 99/100 S. Donovan, Murarrie
 101/102 Enroh Pens, Pine street, Ipswich
 103/104 L. Pritchard, Harte street, Chelmer
 105/106 W. Smith, Holmesbrook street, Grove Estate
 107/108 E. F. Dennis, Herston road, Kelvin Grove
 109/110 T. Brotherton, Prince st., Thompson Estate
 111/112 H. M. Chaille, Blinkbonnie, Esk
 113/114 E. Walters, Lyon street, Moorooka
 115/116 C. C. Dennis, Yeronga
 117/118 E. C. Raymond, Brighton, Sandgate Central
 119/120 J. Harrington, Aspley

OTHER VARIETIES.

- 121/122 Parisian Poultry Yards Toowoomba (Brown Leghorns)
 123/124 J. Ferguson, Broadwater, Nanango (Anconas)
 125/126 J. Ferguson, Broadwater, Nanango (Langshans)
 127/128 A. S. Walters, Doris street, Hill End, South Brisbane (Barred Rocks)
 129/130 R. A. Girling, Long Hill, Kelvin Grove (Black Minorcas)
 131/132 W. H. Forsyth, Willoughby, N.S.W. (Silver Wyandottes)

A SUMMARY OF SOME EXPERIMENTS CARRIED OUT BY THE BUREAU OF SUGAR EXPERIMENT STATIONS.—VII.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, commenced this series in the May (1922) Journal, and in his opening article discussed deep cultivation experiments and tabulated comparative crop result from subsoiled and non-subsoiled fields. The second instalment, an account of results of irrigation experiments and the action of irrigation and manures upon the density and purity of sugar juices, appeared in the June (1922) issue. In the August number Mr. Easterby's notes covered experiments in fertilisation, and were followed in the succeeding issue by an account of distance experiments and resultant crops. In the October (1922) number the summary was continued with notes on the introduction and testing of cane varieties. In the February Journal experiments to determine if cane sets cut from arrowed canes have a prejudicial effect on the germination and subsequent yield were discussed. In his introduction to the Summary of Experiments above mentioned, the Director stated that a summary of the chemical work accomplished by the Bureau, to be prepared by Mr. George R. Patten, formerly Chief Chemist to the Bureau, would also be presented. Mr. Patten has now completed this summary, which entailed a great deal of elaborate work and occupied much time. The results will appear from time to time in the Journal until complete, when the whole summary will then be published in bulletin form.—Ed.

SOIL AND OTHER CHEMICAL ANALYSES.

Summarised by GEORGE R. PATTEN, Analyst, Agricultural Laboratory, Brisbane, formerly Chief Chemist, Bureau of Sugar Experiment Stations.

The average complete analysis of the soils of the sugar districts of Queensland presented in the following tables comprise all the sugar districts existing in 1904.

The magnitude of the analytical work entailed may be gauged by the fact that the number of soils analysed was 857. The sampling took a considerable time, as each sample consisted of four sub-samples totalling 3,428 sub-samples. For convenience of classification the sugar lands of Queensland were divided into three districts—viz., Cairns, Mackay, and Bundaberg—which were subdivided into sub-districts as follows:—

Series No. I. Cairns.—Mossman River, Cairns, Johnstone River, and Herbert River.

Series No. II. Mackay.—Burdekin Delta, Proserpine, and Mackay.

Series No. III. Bundaberg.—Bundaberg, Goodwood, Isis, Logan, Maryborough, and Moreton.

All this work was accomplished by the staff at the Sugar Experiment Station Laboratory, Bundaberg, during years 1901-1909.

The total analyses of the soil, together with agricultural analyses and plant food soluble in aspartic acid, is presented, the object of such analyses being to demonstrate in the first place the plant food immediately available, the acid soluble plant food which by process of weathering, &c., is gradually becoming available, and finally the analyses of the insoluble residue of the soils demonstrating the store of plant food locked up in the insoluble silicates which may in course of time gradually be added to the acid soluble plant foods.

Further tables appear including analyses of soils from Hatton in the Mackay district, and Rockhampton, and finally tables setting forth typical analyses of soil, solubility of plant food in various organic and mineral acids, and water capacity of the Queensland soils.

Subsequent tables present an interesting series of analyses from 1901 to 1922 of various fodders, analysis of the ash of sugar-cane, sugar-cane leaves, preserving action of chemicals on sugar-cane juice, experiments demonstrating comparison of the extraction of sugar from cane by the Laboratory Mill and sugar mill rollers. These experiments and analyses were carried out at the Sugar Experiment Station, Mackay, and at the Agricultural Laboratory, Brisbane, the results of the latter being supplied by courtesy of Mr. J. C. Brünnich, F.I.C., the Agricultural Chemist.

Attention is drawn to the low percentage of lime in the agricultural analyses in the districts from Mossman to Mourilyan, and the high magnesia ratio. The lime content is somewhat better on the Herbert River.

SERIES No 1.
CAIRNS (MOSSMAN).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	76.23	..	..	..
Moisture	1.82	..	..	..
Combustible matter	6.52	..	6.64	..
Silica (SiO ₂) (insoluble) .. ..	..	70.41	54.70	58.57
Silica (SiO ₂) (soluble) .. ..	..	14.61	11.31	12.12
Phosphoric acid (P ₂ O ₅) .. ..	.11	.06	.15	.18
Chlorine (Cl) .. ..	.004	..	.004	.004
Iron oxide (Fe ₂ O ₃)	3.65	1.41	4.80	5.16
Alumina (Al ₂ O ₃)	10.21	8.71	17.16	18.43
Lime (CaO) .. ..	.26	1.04	1.06	1.19
Magnesia (MgO) .. ..	.50	.26	.71	.75
Potash (K ₂ O) .. ..	.53	2.05	2.13	2.28
Soda (Na ₂ O) .. ..	.20	1.09	1.09	1.17
	100.03	99.64	99.75	99.85

Acidic elements in the soils	70.87 per cent.
Basic elements in the soils	28.98 per cent.
Total nitrogen in the soils .. ..	.127 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅) .. ..	.0009	27
Lime (CaO) .. ..	.0659	1,977
Potash (K ₂ O) .. ..	.0137	411

KAMERUNGA (NEAR CAIRNS).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	89.01	..	..	..
Moisture .. ..	.87	..	..	..
Combustible matter	3.55	..	3.58	..
SiO ₂ (insoluble) .. ..	..	89.92	80.74	83.74
SiO ₂ (soluble) .. ..	..	4.81	4.32	4.48
P ₂ O ₅ .. ..	.14	.13	.25	.26
Cl .. ..	.003	..	.003	.003
Fe ₂ O ₃	2.34	.36	2.68	2.68
Al ₂ O ₃	3.01	2.66	5.42	5.62
CaO .. ..	.17	.32	.45	.47
MgO .. ..	.24	.26	.47	.49
K ₂ O .. ..	.28	.79	.99	1.03
Na ₂ O .. ..	.15	1.19	1.21	1.26
	99.76	100.44	100.11	100.03

Acidic elements in the soils	88.48 per cent.
Basic elements in the soils	11.55 per cent.
Total nitrogen in the soils .. ..	.097 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0014	42
Lime (CaO)	·0430	1,290
Potash (K_2O)	·0082	246

HAMBLEDON (NEAR CAIRNS).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	80·25	..	..	..
Moisture	1·45	..	..	..
Combustible matter	5·33	..	5·41	..
SiO_2 (insoluble) .. .. .	..	79·64	64·81	68·50
SiO_2 (soluble) .. .. .	..	9·18	7·47	7·89
P_2O_5	·15	·09	·23	·24
Cl	·002	..	·002	·002
Fe_2O_3	4·45	·81	5·18	5·47
Al_2O_3	7·04	7·77	13·42	14·18
CaO	·28	·42	·62	·66
MgO	·33	·30	·58	·61
K_2O	·47	1·15	1·41	1·50
Na_2O	·17	1·15	1·11	1·07
	99·92	100·51	100·24	100·12

Acidic elements in the soils 76·63 per cent.

Basic elements in the soils 23·49 per cent.

Total nitrogen in the soils 124 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0013	39
Lime (CaO)	·0678	2,034
Potash (K_2O)	·0108	324

MULGRAVE (GORDONVALE) RED SOILS.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	70.43	..	..	..
Moisture	1.98	..	..	..
Combustible matter	7.15	..	7.29	..
SiO ₂ (insoluble) .. ..	..	64.12	46.06	49.66
SiO ₂ (soluble) .. ..	..	20.65	14.83	15.99
P ₂ O ₅ .. ..	.22	.04	.26	.28
Cl .. ..	.002	..	.002	.002
Fe ₂ O ₃	7.18	4.12	10.28	11.08
Al ₂ O ₃	12.13	9.05	18.87	20.34
CaO .. ..	.32	.71	.84	.90
MgO .. ..	.34	.64	.81	.88
K ₂ O .. ..	.40	.49	.76	.82
Na ₂ O .. ..	.17	.50	.53	.57
	100.32	100.32	100.53	100.51
Acidic elements in the soils		.. ..	65.93	per cent.
Basic elements in the soils		.. ..	34.58	per cent.
Total nitrogen in the soils		.. ..	.127	per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅) .. ..	.0009	27
Lime (CaO) .. ..	.1065	3,395
Potash (K ₂ O) .. ..	.0238	714

MULGRAVE (GORDONVALE) ALLUVIAL SOILS.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	78.20	..	..	..
Moisture	1.78	..	..	..
Combustible matter	5.72	..	5.83	..
SiO ₂ (insoluble) .. ..	..	77.02	61.31	65.09
SiO ₂ (soluble) .. ..	..	10.94	8.71	9.24
P ₂ O ₅ .. ..	.16	.06	.21	.22
Cl .. ..	.002	..	.002	.002
Fe ₂ O ₃	4.70	.64	5.30	5.62
Al ₂ O ₃	8.17	8.46	15.05	15.98
CaO .. ..	.27	.88	.98	1.04
MgO .. ..	.42	.30	.66	.71
K ₂ O .. ..	.40	.84	1.03	1.10
Na ₂ O .. ..	.14	1.36	1.22	1.22
	99.96	100.50	100.30	100.22

Acidic elements in the soils 74.56 per cent.
 Basic elements in the soils 25.66 per cent.
 Total nitrogen in the soils113 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

					Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	..	..	..	..	·0012	36
Lime (CaO)	..	..	..	..	·0972	2,916
Potash (K_2O)	..	..	..	..	·0100	300

GERALDTON (INNISFAIL) RED SOILS.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	42·05	..	..	..
Moisture	4·23	..	..	..
Combustible matter	15·78	..	16·47	..
SiO_2 (insoluble)	..	82·09	36·05	43·15
SiO_2 (soluble)	..	10·17	4·47	5·34
P_2O_5	·27	·07	·31	·37
Cl	·005	..	·005	·005
Fe_2O_3	16·52	2·54	18·37	21·97
Al_2O_3	20·47	3·60	22·86	27·36
CaO	·08	·09	·12	·15
MgO	·20	·08	·24	·29
K_2O	·17	·24	·28	·34
Na_2O	·20	1·46	·85	1·02
	99·97	100·34	100·02	99·99

Acidic elements in the soils 48·86 per cent.

Basic elements in the soils 51·13 per cent.

Total nitrogen in the soils ·173 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

					Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	..	..	..	..	·0006	18
Lime (CaO)	..	..	..	..	·0230	690
Potash (K_2O)	..	..	..	..	·0176	528

GERALDTON (INNISFAIL) ALLUVIAL SOILS.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	56.07	..	..	..
Moisture	3.95	..	..	..
Combustible matter	11.94	..	12.43	..
SiO ₂ (insoluble) .. ..	..	61.84	36.08	41.21
SiO ₂ (soluble) .. ..	..	24.48	14.31	16.34
P ₂ O ₅ .. ..	.23	.06	.27	.31
Cl .. ..	.005	..	.005	.005
Fe ₂ O ₃	8.34	1.29	9.44	10.78
Al ₂ O ₃	18.47	9.23	24.62	28.12
CaO .. ..	.13	.09	.19	.22
MgO .. ..	.44	.13	.54	.62
K ₂ O .. ..	.26	1.26	1.01	1.15
Na ₂ O .. ..	.15	1.42	.99	1.13
	99.98	99.80	99.88	99.88

Acidic elements in the soils 57.86 per cent.

Basic elements in the soils 42.02 per cent.

Total nitrogen in the soils165 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅) .. ..	.0006	18
Lime (CaO) .. ..	.0398	1,194
Potash (K ₂ O) .. ..	.0145	435

MOURILYAN.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	57.23	..	..	..
Moisture	2.99	..	..	..
Combustible matter	11.93	..	12.20	..
SiO ₂ (insoluble) .. ..	..	68.15	40.40	46.00
SiO ₂ (soluble) .. ..	..	22.13	13.05	14.59
P ₂ O ₅ .. ..	.08	.13	.16	.18
Cl .. ..	.004	..	.004	.004
Fe ₂ O ₃	8.71	.77	9.43	10.94
Al ₂ O ₃	18.04	6.81	22.61	25.74
CaO .. ..	.20	.12	.28	.32
MgO .. ..	.43	.09	.49	.56
K ₂ O .. ..	.21	.81	.70	.79
Na ₂ O .. ..	.19	1.45	1.05	1.20
	100.03	100.46	100.37	100.32

Acidic elements in the soils 60.77 per cent.

Basic elements in the soils 39.55 per cent.

Total nitrogen in the soils164 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅)	·0006	18
Lime (CaO)	·0311	933
Potash (K ₂ O ₅)	·0137	411

HALIFAX (HERBERT RIVER).

Constituent Element.	Agricultural Analysis.	Insoluble Residue. Insoluble in Hydrochloric Acid.	Absolute Analysis.	
			Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	79·13	..	..	..
Moisture	2·35	..	..	..
Combustible matter	5·62	..	5·76	..
SiO ₂ (insoluble) .. .. .	..	67·68	54·84	53·17
SiO ₂ (soluble) .. .. .	..	14·10	11·42	12·12
P ₂ O ₅	·13	·05	·17	·19
Cl	·002	..	·002	·002
Fe ₂ O ₃	3·93	·66	4·56	4·84
Al ₂ O ₃	7·52	11·27	16·84	17·86
CaO	·49	·54	·94	1·00
MgO	·51	·44	·88	·94
K ₂ O	·24	2·59	2·36	2·50
Na ₂ O	·14	2·89	2·49	2·64
	100·06	100·22	100·26	100·26

Acidic elements in the soils 70·48 per cent.
Basic elements in the soils 29·78 per cent.
Total nitrogen in the soils ·112 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅)	·0012	36
Lime (CaO)	·1035	3,105
Potash (K ₂ O)	·0138	414

INGHAM.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	84.13	..	..	..
Moisture	1.67	..	..	..
Combustible matter	4.89	..	4.99	..
SiO ₂ (insoluble) .. ..	..	75.00	64.16	67.52
SiO ₂ (soluble) .. ..	..	9.38	8.02	8.44
P ₂ O ₅	1.14	0.06	0.20	0.21
Cl	0.002	..	0.002	0.002
Fe ₂ O ₃	2.85	0.46	3.29	3.46
Al ₂ O ₃	5.43	9.72	13.84	14.57
CaO	0.32	0.65	0.88	0.93
MgO	0.31	0.53	0.77	0.81
K ₂ O	0.19	2.33	2.19	2.31
Na ₂ O	0.14	2.15	1.99	2.09
	100.07	100.28	100.33	100.34

Acidic elements in the soils 76.17 per cent.

Basic elements in the soils 24.17 per cent.

Total nitrogen in the soils 0.087 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅)	0.0010	30
Lime (CaO)	0.0508	1,524
Potash (K ₂ O)	0.0121	363

RIPPLE CREEK.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	79.46	..	..	..
Moisture	2.14	..	..	..
Combustible matter	5.83	..	5.95	..
SiO ₂ (insoluble) .. ..	..	70.16	56.96	60.54
SiO ₂ (soluble) .. ..	..	13.44	10.91	11.60
P ₂ O ₅	0.12	0.14	0.24	0.25
Cl	0.002	..	0.002	0.002
Fe ₂ O ₃	3.97	0.77	4.67	4.97
Al ₂ O ₃	7.37	9.29	15.07	16.02
CaO	0.46	0.86	1.17	1.24
MgO	0.51	0.69	1.08	1.15
K ₂ O	0.24	2.56	2.32	2.47
Na ₂ O	0.13	2.50	2.17	2.30
	100.33	100.41	100.54	100.54

Acidic elements in the soils 72.39 per cent.

Basic elements in the soils 28.15 per cent.

Total nitrogen in the soils 0.106 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0009	27
Lime (CaO)	·0908	2,728
Potash (K_2O)	·0171	513

THE FARMERS' FURRED AND FEATHERED FRIENDS.

"The Animals and Birds Act of 1921."

The following particulars are published for general information:—

All wild animals or birds not named in the subjoined Schedules are totally protected during the whole year throughout Queensland.

SCHEDULE I.—ANIMALS THAT ARE NOT PROTECTED.

All introduced wild animals, including Fox, Rabbit, and Hare	Kangaroo (all species, but not the Tree Kangaroo)
All reptiles	Native Cat (all species)
Bandicoot (all species)	Paddymelon
Bat or Flying-fox (all species)	Rat (all species)
Dingo	Wallabies (all species)

BIRDS THAT ARE NOT PROTECTED.

Eudgerigah or Shell Parrot	Indian Dove (introduced)
Cockatoo Parrot or Quarrier	Indian Myna (introduced)
Cormorant or Shag (all species)	Long-billed Cockatoo or Corella
Crow and Raven	Rosella Parrot (all species, including Crimson Parrot)
Currawong or Scrub Magpie (Bell Mag- pie)	Sparrow (introduced)
Galah or Rose-breasted Cockatoo	Starling (introduced)
Goldfinch (introduced)	White Cockatoo (all species)

SCHEDULE II.—BIRDS PARTIALLY PROTECTED.

Brush or Scrub Turkey	Lonikeet or Honey Parrot (all species)
Bustard or Plain Turkey	Native Hen
*Coot (Redbill, &c.)	Pigeon and Dove (all wild species, except "Squatter" and "Whampoo")
*Emu	Plover.
Finch (all native species except Painted or Gouldian Finch)	Quail (all species)
*Goose and Duck (all species, excluding Black Swan)	Redwing Parrot
King Parrot	Ringnecked Parrot
	Sea Curlew and Sandpiper

In District No. 1 (South Queensland), from the first day of September in each year to the thirty-first day of March in the following year, inclusive.

In District No. 2 (North Queensland), from the first day of December in each year to the thirty-first day of May in the following year, inclusive.

*Provided that for Emus on prickly-pear infested land, and Coots in Northern Sugar Districts, the Close Season shall be from the first to the seventh day of July in each year, inclusive.

LIST OF SANCTUARIES WITHIN WHICH THE DESTRUCTION OR CAPTURE OF NATIVE BIRDS OR ANIMALS (WHETHER PARTIALLY PROTECTED OR OTHERWISE) IS PROHIBITED DURING THE WHOLE YEAR.

Archer (property of H. M. Jones)	Malanda (J. English's property)
Barambah Creek	Malanda (swamp of 160 acres)
Barron Falls (National Park)	Maleny (properties of A. J. Thynne, A. Marshall, and A. W. Thomason)
Barron Shire (roads, reserves, and unalienated lands in the Shire of Barron)	Manumbar and Kilkivan (Timber Reserve)
Bellenden-Ker (Reserve for Native Fauna)	Mareeba (Pasturage Reserve)
Blue Mountain Holding, Mackay	Maroochy Shire
Boonara	Mount Cooroy and Inlet, Noosa River
Bowen (Denison Park)	Mount Coot-tha Reserve
Bribie Island	Mount Glorious (G. Lee's property, near summit)
Bunya Mountain (National Park)	Mount Morgan—Dee River (Mount Morgan Gold Mining Company's property)
Burdekin Weir	Mud Island
Cabbage Tree Creek Reservoir and Catchment Area	North Keppel Island
Calliope River (Water Reserve)	Nudgee Waterhole
Calliungal (Water Reserve R. 38)	Peel Island
Capricorn Group of Islands	Pentland Town Reserve
Charters Towers (Reeve's Lake, part of Lolworth Creek, Reed Beds, and La Batt's Lake)	Point Danger (foreshores of ocean two miles back from portion 2, parish of Gilston, to Point Danger)
Chelmer Recreation Reserve	Pumice Stone Channel
Coochie-Mudlo	Redcliffe Shire
Cressbrook	Rewan Stud Farm for breeding Police horses
Doonela Lake	Rockhampton (Jardine's Lagoon)
Dugandan (property of Mr. McConnel)	Rockhampton (Murray's Lagoon)
Eagle Junction (Kalinga Park)	Rockingham Bay (the islands therein)
Eidsvold Camping and Water Reserve	Seaforth and adjacent islands
Emu Park (Town of Emu Park)	Stradbroke Island
Enoggera Reservoir and Catchment Area	Stuart River
Etheridge Goldfield (Cumberland Dam)	Taylor, parish of (W. Gutteridge and W. E. Hammond's properties)
Flaggy Creek Timber Reserve	Taroona (Tualka Creek Water Reserve)
Gold Creek and Moggill Creek Drainage Area	Tingalpa Shire
Gooburrum Shire (roads, reserves, and unalienated lands)	Toowong (Sir R. Philp's property, Toowong Sports Ground, and adjoining land)
Gracemere (R. S. Archer's property)	Toowoomba (Jubilee Park)
Great Keppel Island	Toowoomba (One-tree Hill)
Hamilton Golf Links	Toowoomba (Picnic Point)
Hinchinbrook, Barnard, Raine, Eva Islet, Agnes Islet, Channel Rock, Goold and Garden Islands	Toowoomba (Redwood Park)
Hornet Bank (W. C. Mayne's property)	Toowoomba Rifle Range
Houghton River (Horseshoe Lagoon)	Townsville (Abattoir Reserve)
Jarvisfield (Church Lagoon)	Townsville, county of Wilkie Gray, parish of Hinchinbrook (Wm. Young's property)
Jarvisfield (Sheep Station Creek)	Townsville (German Garden Lagoons and adjoining swamps)
Jarvisfield (Red Lily Lagoon)	Townsville (Pink Lily Lagoon)
Jordan Goldfield (3,600 acres)	Valley of Lagoons Holding
Kuranda (Monamena Mission)	Wynnum, Town of
Lake Clarendon	Widgee Shire
Lake Murphy	Yaamba (late P. F. Macdonald's property)
Lamington National Park	
Mackay Town (roads, reserves, and unalienated lands)	
Mackay (Denman's Waterhole)	
Mackay (Orphanage Swamp)	
Magnetic Island	

GENERAL PROVISIONS.

Offences against the Act, for which severe penalties are provided, include—

Trapping or dealing in native birds or animals without a license. A trapper's license costs 5s., and a dealer's license 10s. They may be taken out at the office of the nearest Clerk of Petty Sessions.

Capturing or killing a partially protected wild bird or animal during the close season.

Capturing or killing a totally protected wild bird or animal at any time.

Capturing or killing a totally protected or partially protected wild bird or animal at any time in a sanctuary.

Interfering with any notice under this Act.

Taking the eggs of any protected or partially protected bird.

Using poison for killing Opossums or Native Bears.

Using acetylene lamp or similar torch in the killing of Opossums or Native Bears.

The following are the maximum numbers one individual shooter can kill in any one day:—

Wild Ducks	..	..	..	..	..	..	..	20
Wild Geese	..	..	..	..	..	..	..	10
Quail	..	..	..	..	..	..	..	25
Pigeons (except Squatter and Whampoo)	..	..	..	..	..	..	..	10
Plain Turkeys	..	..	..	..	..	..	..	2
Scrub Turkeys	..	..	..	..	..	..	..	2
Plovers	..	..	..	..	..	..	..	10

FRUIT FLY CHECKED BY COLD STORAGE.

An Interesting Experiment Produces Highly Satisfactory Results.

In order to determine the possibility of destroying the larvæ and eggs of fruit flies present in fruit grown in the Stanthorpe district, some twelve cases of apples were placed in cold store in Brisbane on the evening of the 26th March. Samples of these fruits were submitted daily to the Government Entomologist and Pathologist, with the exception of the period embraced by the Easter holidays, and the following is a précis of a report submitted by Mr. Henry Tryon, Government Entomologist, to the Fruit Branch respecting same:—

“Of the apples placed in cold storage, 34 per cent. manifested fruit fly infestation. This infestation was represented exclusively by insects either in the egg phase of life or by young maggots 1 to 1½ mm. in length that had recently hatched from eggs. These insects survived and grew slowly until at least the expiration of two or three days with augmented damage, but seldom if ever attaining the degree to render the fruit unsaleable. They had, however, all died at a date between 30th March and 5th April, indicating that the duration of the cold storage necessary to destroy them was not less than four days or more than eight days. The temperature of the cold store fluctuated from 34 to 42 deg. Fahr. As a result of this experiment it is proved that fruit fly larvæ infested fruit and fruit fly damage in fruit may be brought to a standstill by cold storage for a period of less than ten days, possibly much less.” The results obtained are highly satisfactory, as in the opinion of the officers of the Fruit Branch it will now be possible to prevent much of the serious damage that takes place in the case of such apples as Gravenstein if they are placed in cold store in the earlier stages of their infestation, and fruits so treated will not deteriorate to any extent and meet with a ready local sale.

A CORELESS APPLE—AN AMERICAN DISCOVERY.

Apples without cores or seeds are promised by a discovery announced at Abbotsford, Canada. According to the announcement, a seedless and coreless variety of Fameuse apple has been developed, which differs but slightly in shape from an ordinary Fameuse by being longer, and flatter at the ends, but with the typical colouring and flavour. Except for a slight marking on the flesh, which outlines the situation of the core in an ordinary apple, there are neither core nor seeds. The apples were developed in an orchard at Abbotsford, and the discovery that they were out of the ordinary was an accident. They had come from a new block of Fameuse about eight years old, bearing for the first time in market quantities. The discovery was made while grading for market, but unfortunately no record was kept of the tree or trees producing the new fruit, and it will not be before another harvest that steps can be taken for its commercial development.

NEW WHEAT TRIALS.

SUMMARY OF RESULTS—SEASON 1922.

For a number of years the Department of Agriculture and Stock has carried on a system of wheat-breeding and selection for the purpose of improving existent varieties. Good work has been accomplished in the last decade, particularly at the Roma State Farm, where Mr. R. E. Soutter carries on the duties of plant breeder and manager. As a result of carefully designed work a number of new strains of wheat have been evolved, and the practice was followed of testing these under field conditions at the State Farm, also throughout the main wheatgrowing districts in the State.

Co-ordinated work of this description between the plant breeder and field officers of the Department has resulted in the segregation of a number of promising strains of wheat, which show unmistakably that they possess certain field characteristics markedly superior to those commonly found in varieties now in general cultivation.

Concurrently with the field trials in different districts, milling tests were carried out by the Agricultural Chemist to determine the nutritive and flour-yielding qualities of the varieties selected under the improvement system, in order that nothing but the best might be brought into cultivation. It is to be generally conceded that many of the varieties of wheat in cultivation throughout the State could be improved, and that the elimination of varieties such as these would have an effect of engendering a greater feeling of security in wheatgrowing as an occupation if other and superior kinds could be grown in their place.

To secure the co-operation of wheatgrowers, a scheme was outlined by this Department and put before the growers' representatives on the Wheat Board, who unanimously decided to adopt the system of the classification of the State into districts and the allotment thereto of varieties to suit representative soils and conditions common to the respective localities.

The next step decided upon was the active co-operation of members of the Wheat Board and officers of the Department of Agriculture in respect to the selection of sites in different districts where the season's trials could be carried out. Provision was also made that seed wheat from the resultant crops should be made available to the grower and the surplus employed for extending the cultivation of the particular variety, the Wheat Board in this latter connection undertaking to carry out a system of cleaning and grading the grain at their central depot near Toowoomba.

It is generally recognised that considerable reduction could be effected in the number of varieties of wheat in general cultivation, which are said to exceed three score in number. Standardisation of types of Queensland-grown grain is being aimed at, so that only those varieties conforming to same may be eventually grown on a commercial scale. Last wheat season proved to be a dry one; in fact, the wheats under review were grown on a rainfall ranging from a minimum of 1 inch to a maximum of 4 inches, experienced during the growing season.

Another factor operating against the success of the wheat trials was the fact that good rains for germinating the seed were not experienced at the ordinary sowing season, and planting operations were in consequence delayed fully a month.

The undermentioned record of yields was obtained by the Department from growers:—

48	acres of	"Roma Red No. 2"	averaged	27 12/60	bushels	pr. ac.
36	" "	"Cedric No. 2"	"	25 43/60	" "	" "
163	" "	"Warchief No. 2"	"	22 22/60	" "	" "
73	" "	"Roma Red No. 5"	"	21 37/60	" "	" "
134	" "	"Novo No. 5"	"	21 24/60	" "	" "
69	" "	"Roma Red No. 7"	"	20 37/60	" "	" "
Total 523 acres.				Averaged	22 32/60	" "



PLATE 100.—A COTTON FIELD AT PULLEN VALE, NEAR BRISBANE. MR. HUGH McMARTIN'S PLANTATION.



PLATE 101.—COTTON ON MR. E. ARNDT'S FARM, THORNTON, LAIDLEY.



PLATE 102.—CATTLE ON THE BURNETT, NEAR GAYNDAH.



PLATE 103.—MR. HARRY LEGGATT, A REID'S CREEK (GAYNDAH) PIONEER, AND THE WAGGON WITH WHICH HE OVERLANDED FROM ADELAIDE NEARLY FORTY YEARS AGO.



PLATE 104.—A BURNETT COTTON CROP.
Mr. Thos. Gishford's Farm on Barambah Creek, near Gayndah.



PLATE 105.—THE BOUNTIFUL AND BEAUTIFUL BURNETT.
Outlook from Northern Escarpment, Binjour Plateau.

THE PINEAPPLE TRADE—CAUSE OF DAMAGE—CARELESS HANDLING.

During recent years pineapple production in Queensland has increased to a very marked extent and large quantities of the fruit are sent to the Southern markets. Unfortunately, the pineapples often arrive in New South Wales in very bad condition, and whilst recently in Sydney, Mr. W. Rowlands, Queensland Government Packing Instructor, had his attention drawn to the matter. He has now reported to the Department of Agriculture and Stock as follows:—

"It was pointed out to me by those dealing with pineapples that for the last eight years this fruit has been arriving in more or less bad condition, especially during February, March, and April of each year, and so far nothing has been done to remedy the trouble. Agents stated that growers doubt their word when informed of the condition of their pineapples on arrival. On inquiry I ascertained that between 400 and 500 cases weekly are lost in repacking, and as pineapples in good order are realising 10s. to 11s., the loss to Queensland growers has been considerable. One Sydney agent estimates his loss at £60 weekly. Through the courtesy of several agents who handle pineapples I was given assistance to open every consignment for my inspection, and out of thirty lots three consignments only opened up in perfect condition. On close examination I was able to see that the pineapples in good order had been cut from the plant, while the bad conditioned pines had been broken off. My conclusion was that the pineapples arriving in good condition had been cut from the plants with $\frac{1}{2}$ -inch stems; on the other hand fruit arriving in bad order had been broken off and handled carelessly.

"I at once telegraphed to Mr. G. Garrad, of Woombye, to send pineapples with longer stems and to cut them. Mr. Garrad replied that he was forwarding some cases as usual and some as I suggested. This fruit was examined by me on arrival, and it was found that the pineapples with long cut stems were in perfect order, while the pineapples sent as usual were in very bad order indeed. Since, several other consignments cut as suggested have arrived in good order. A Woombye grower in Sydney stated that it was not usual in his district to cut pineapples, but to break them off. He has returned determined to cut all pineapples in future.

"My opinion is that when growers are breaking off pineapples they injure the centre of the fruit and immediately decay sets in. It is common to see half green pineapples rotten at the base. I would suggest that all pineapple growers be notified to cut pineapples with at least $\frac{1}{2}$ -inch stem and not to break them off under any consideration; to handle all pineapples for interstate trade as carefully as possible, and not to 'bulge-pack' this fruit."



PLATE 106.—A PULLEN VALE FALLING, NEAR INDOOROOPIILLY, BRISBANE.

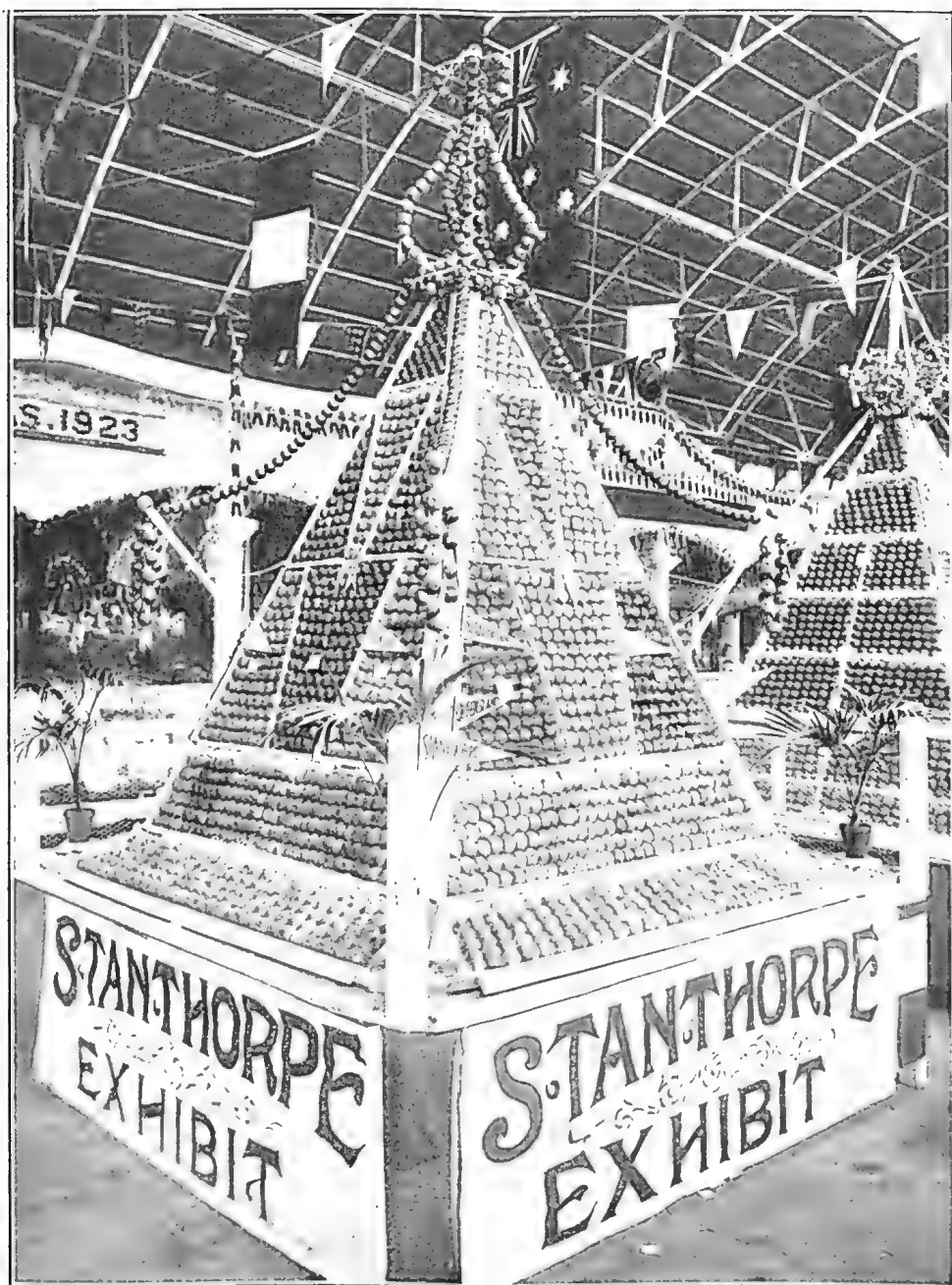


PLATE 107.—A PRIZE-WINNING EXHIBIT, ROYAL AGRICULTURAL SHOW, SYDNEY. 1923.

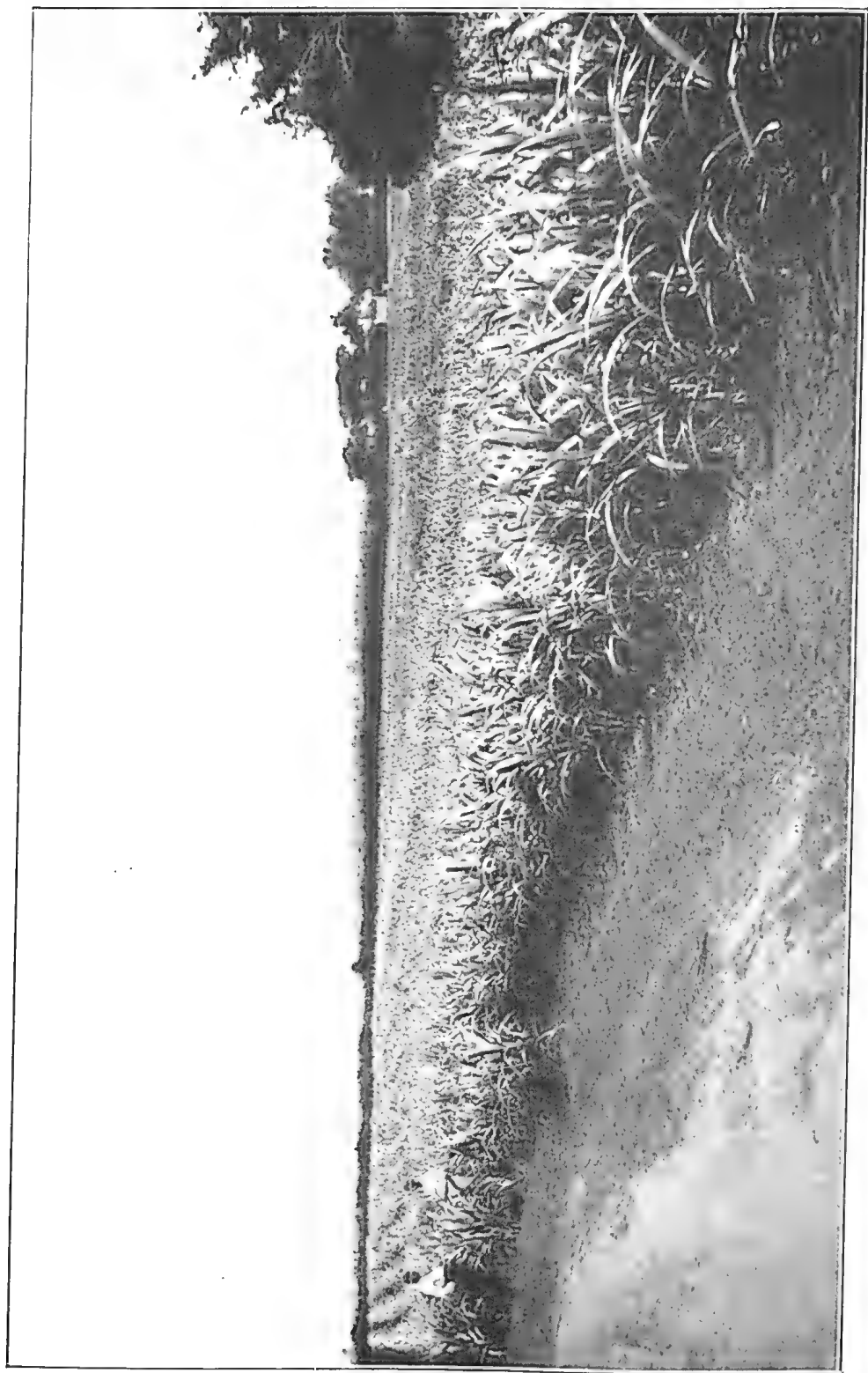


PLATE 108.—PLANT CANE, SUGAR EXPERIMENTAL STATION, MACKAY.

General Notes.

Native Bears and Opossums.

A notice has been published extending the close season for native bears and opossums until the 31st May, 1923. It is, of course, possible that this close season may be still further amended or extended.

Departmental Appointments.

The resignation of James M. Gibson as Cane-growers' Representative on the Racecourse Local Sugar Cane Prices Board has been accepted, and Robert S. Stevens has been appointed in his stead. Mr. F. C. Henk, of Palmwoods, has been appointed an Honorary Inspector under "*The Diseases in Plants Act of 1916.*"

Fruit Industry—Lantern Slide Lectures and Fruit Packing Classes.

Fruitgrowers of the North Coast districts are now receiving a good deal of attention by way of horticultural education. The Chief Instructor in Fruit Culture (Mr. J. M. Ward) has been visiting a number of the fruit districts and delivering lantern slide lectures, and giving practical advice to individual orchardists. The chief subjects dealt with included the judicious selection of approved stocks and buds from proved productive trees producing the correct type of fruit; cultivation; manuring; agricultural education; organisation. Each subject was admirably illustrated with lantern slides. The lectures are being extended throughout the various fruit centres.

At the end of some of the lectures demonstrations were given by the Government Packing Expert (Mr. W. Rowlands) in packing oranges into the case to be adopted next year; the dimensions of the case in question are 20 inches long by 11½ inches wide by 10 inches deep (inside measurements). All who saw the case packed expressed satisfaction with it.

Packing classes for school children are to be conducted throughout the fruit season. The first of these was started at Buderim on 8th May, and was to be followed by others at Palmwoods, Mapleton, Nambour, Woombye, Montville, Yandina, and other centres. Growers are giving practical assistance to this class of instruction by way of finding packing sheds, fruit, cases, &c., and otherwise giving the subject their general support. After the students have packed the fruit it will be ready to be shipped to any market. Between forty and fifty of such classes have been in active operation in Tasmania during the past three years, and have proved most successful, and there is every reason to consider they will be of equal success in Queensland.

A Warwick Mill and the State Wheat Board.

In the "Courier" of the 17th instant a paragraph appeared, emanating from Warwick, relating that the Warwick Co-operative Farmers' Milling Company, having worked almost continuously for over two years, had now been compelled to reduce operations to one shift, and laying the responsibility for this upon the State Wheat Board. It was also stated that existing regulations were in favour of the Brisbane mills, which were obtaining wheat at 5s. 3d. a bushel compared with the Board's price of 6s. 5½d. a bushel. Further, a charge was made that the Brisbane mills could lay down flour in Warwick at 30s. a ton cheaper than the local article.

The Acting Minister for Agriculture, Mr. Huxham, communicated with the Wheat Board immediately the paragraph appeared, and the Board characterises as absurd and without foundation the statement that flour could be laid down in Warwick at 30s. a ton cheaper than the local article.

That the Brisbane mills are handling large quantities of Southern wheat at 5s. 3d. a bushel is not a fair way of stating the matter. The price quoted is the New South Wales price, and to it has to be added freight by sea, handling, and other charges—which would bring the State Wheat Board's price of 5s. 8d. a bushel, not 6s. 5½d. as stated in the article, in favourable comparison with Southern prices. As a matter of fact, the Warwick Farmers Milling Company had been allotted by the State Wheat Board more than its quota out of the wheat available from the last harvest.

Sugar Assessment.

An Order in Council under "The Regulation of Sugar Cane Prices Acts, 1915 to 1921," has been issued to the effect that the assessment to be levied on every ton of sugar-cane received at any mill on and after the 11th May, 1923, is fixed at 2d. per ton. Further, the Minister has levied an assessment at the rate of ½d. per ton on every ton of sugar-cane received at sugar-works during the season 1923-24 under "The Sugar Experiment Stations Act of 1900."

The Pink Boll Worm.

The same report states that the pink boll worm (*Pectinophora gossypiella* Saunders) of cotton is even more dangerous as a cotton pest than the cotton boll weevil, and is reported as occurring in small areas in Texas, Louisiana, and New Mexico. Accidentally introduced into the Southern States, it is adding to the difficulty of producing cotton in States already infested with the boll weevil. The Federal Horticultural Board has undertaken eradication measures in co-operation with the States concerned. Quarantines, both State and Federal, have been issued and effectively enforced. California Quarantine Order No. 39 applies to pink boll worm as well as to cotton boll weevil.

The Cotton Boll Weevil: Its Spread in American Cotton Country—How California Keeps Free.

In the report of the Bureau of Plant Quarantine (Third Report of the Californian Department of Agriculture, Monthly Bulletin, November-December, 1922) the history and habits of the cotton boll weevil (*Anthonomus grandis* Boh.) are briefly discussed. Discovered in two counties in the southern end of Texas in 1894, the weevil has now become established in every southern cotton-growing State, where the damage is estimated to be well in excess of 200,000,000 dollars annually. During the year 1921 the insect spread to 66,661 square miles of new territory, and since in Arizona there is a variety of cotton boll weevil (*Anthonomus grandis* var. *thurberiae*) infesting wild cotton in the mountainous regions, California is the only cotton-growing State in the Union free from every form of cotton boll weevil. This position is being strenuously maintained. A strong and drastic Quarantine Order (No. 32) is being rigorously enforced, and this is assisting materially in preventing an incursion of the cotton boll weevil into California.

How to Pick a Layer and Breeder.

Mr. W. Hindes, of Manly, lectured very informatively before a meeting of the National Utility Poultry Breeders' Association recently. White Leghorn and Black Orpington pullets were used for purposes of demonstration. In each case, one bird was a very good and the other a poor specimen of the breed, and this enabled the lecturer to compare good and bad points in each breed. The lecturer commended the trap-nesting method of testing layers, as the initial expenditure in erecting single-test pens limited the volume of work considerably. Continuing, the lecturer said that heavy egg-production was an inherited factor, the male bird must be prepotent. To prove whether the bird had this characteristic it was necessary to wait for some time until the progeny had been tested. If results were satisfactory the bird could then be used for three or four more seasons. In Mr. Hindes's opinion it is a grave error to follow the practice of many breeders by discarding the male bird after the first season. After a little experience, the lecturer stated, it became almost an instinct to pick layers as they pass in front of one. Handling and measuring could then be resorted to, if desired, merely to confirm one's opinion. The characteristics to look for were found first in the head and eye and then in body conformation. Of course, vigour and capacity were absolutely necessary. Mr. Hindes's observations proved that the best layers were usually a little flat breasted and flat sided, but very deep behind. He did not like a bird pinched towards the abdomen or narrow across the back. The vitality of a flock must be retained if heavy egg production is desired. This can be done by mating a slightly larger female than one would select for a laying competition with a fair or medium-sized cockerel from the fastest layer procurable. The lecturer liked fine texture in comb, which should not be too large or too thin. If the latter, the combs in the male progeny would be liable to droop over on one side. Birds with extra long and fine pelvic bones, he considered to be lacking in stamina. They might lay well for say fifteen months, while birds with stouter pelvic bones, other things being equal, he found, laid well for three or four seasons. Straight pelvic bones are desirable.

Agricultural Education—Activities of the Queensland University.

On 9th August, 1916, on the motion of Mr. J. D. Story, the senate of the University carried a resolution that, as the question of the primary industries is closely interwoven with post-war problems and a good system of agricultural education will be helpful in the development and expansion of the primary industries of Queensland, it is desirable that agricultural education should be carefully organised and developed.

The senate at the same time appointed a select committee, under the chairmanship of Mr. Story, to inquire into and report upon the whole question of agricultural education.

The committee, in its report, dealt exhaustively with the types of employers and employees who would be benefited by a systematic training under a suitable scheme of agricultural education, and also with the benefits which would accrue to the State as a whole. In its conclusions, the committee commented favourably on the work which was then being done in the recently established rural school at Nambour, and strongly recommended the establishment of similar schools in other agricultural centres as a first step towards a general scheme of agricultural education for the State. The committee also recommended that steps should be taken as early as practicable to organise the work of higher agricultural education on a diploma course basis, which would lead ultimately to the development of a full degree course in agriculture. However, in the absence of funds for the purposes, the senate has not been in a position to take any practicable steps towards that end. Recent developments in regard to the agricultural activities of the State have again revived the question, and the investigations made by Mr. Story during his visit to California towards the end of last year have proved that the recommendations of the select committee were substantially sound, and that a comprehensive system of agricultural education should form an inseparable part of any scheme for the expansion of these industries.

At the first meeting of the senate after his return to Queensland Mr. Story submitted a memorandum emphasising the need for the suitable training of future agriculturists, instructors, researchers, and leaders of the industry generally. He also advocated suitable provision for scientific investigation and research. His recent inquiries in California showed that a Department of Agriculture is regarded as a very desirable department in a University, particularly in a State which is mostly dependent upon the primary industries. They also showed that to enable a University to deal satisfactorily with the educational and research work of agriculture an area of not less than 600 acres was required, and that such an area, if it cannot be actually part of the University domain, should be within forty-five minutes' journey by conveyance of the University.

Finally, the following resolutions (amongst others) were carried by the senate:—

- (a) That the memorandum submitted by Mr. Story on the question of the organisation and development of agricultural education in Queensland be received and particulars contained therein noted.
- (b) That, seeing that it is not practicable at the present time to establish a Faculty of Agriculture or a Department of Agriculture, steps be taken as soon as possible for the institution of a Diploma of Agriculture.
- (c) That a survey be made as to the directions in which the research work of the University could be extended so as to include those matters of economic importance to the primary industries, and concerning which work is not being done by the Commonwealth Institute of Science and Industry.
- (d) The possibility of co-operation with the Council of Agriculture, with a view to the council's assisting financially in regard to research work which the council might ask the University to undertake.
- (e) That a committee, consisting of Professor Richards and Professor Goddard (of the University staff), Mr. Riddell (assistant chief inspector), Mr. F. C. Thompson (principal of the practising school), and Mr. Hamlin (who succeeds Professor Johnston as officer in charge of the prickly-pear experimental station), be appointed to inquire into and report upon the whole question of the establishment of a Diploma of Agriculture.
- (f) That a site of sufficient area for the practical work of a Faculty of Agriculture be secured as soon as possible.

Seed Cotton—Further Encouragement to Growers.

In January last an announcement was made that, for the year ending the 31st July, 1924, the advance to be made by the Government for seed cotton delivered at the nearest ginnery, or as might be otherwise arranged, would be, for seed plant cotton of good quality free from disease and defects, of 1½-inch staple, 5½d. per lb., and for less than 1½-inch staple, 4½d. per lb. The advance to be limited to areas not exceeding 50 acres.

The Minister for Agriculture (Hon. W. N. Gillies) now desires to make it clearly known to growers that the Government, owing to the drought and the consequent circumstances of the industry, has decided to make the advance for the year ending the 31st July, 1924, as follows:—

For seed plant cotton of good quality, free from disease and defects, of 1½-inch staple	... .. 5½d. per lb.
If of lesser staple than 1½ inch	.. .. 5d. per lb.

The other conditions issued in January last in relation to the advance to remain.

Thus it will be seen that growers will, owing to this decision of the Government, be in a better position to make their arrangements for the coming planting. No alteration has been made in relation to the advance for seed cotton of 1½-inch staple, and for seed cotton of lesser staple the advance has been increased by ½d. per lb. over the January conditions, and the encouragement thus given should ensure an area under cotton that will be considerably in excess of the area planted in 1922-23, with a great increase in the harvest, if there is an improvement in the season on that of last year that can be reasonably looked for.

The Bacon Industry on the Downs.

As an illustration of the progress of the bacon industry on the Downs, it is stated that last year the Downs Co-operative Bacon Company treated 31,842 pigs, of which 31,386 were baconers. Since the inception of the factory £1,250,000 has been realised on transactions, while the farmers have received over £1,000,000 from the factory for swine.

FORTHCOMING SHOWS.

Murgon: 17th and 18th May.	Pine Rivers: 27th and 28th July.
Wallumbilla: 22nd and 23rd May.	Crow's Nest: 31st July and 1st August.
Ipswich: 23rd and 24th May.	Sandgate: 3rd and 4th August.
Kilkivan: 23rd and 24th May.	Brisbane Royal National: 6th to 11th August.
Springsure: 23rd and 24th May.	Belmont: 18th August.
Beaudesert: 29th and 30th May.	Wynnum: 31st August and 1st September.
Marburg: 2nd to 4th June.	Zillmere: 8th September.
Mackay: 4th to 7th June.	Laidley: 13th and 14th September.
Woombye: 20th and 21st June.	Beenleigh: 20th and 21st September.
Lowood: 22nd and 23rd June.	Rocklea: 22nd September.
Rockhampton: 21st to 23rd June.	Toombul: 28th and 29th September.
Ithaca: 29th and 30th June.	Kenilworth: 4th October.
Kilcoy: 28th and 29th June.	Ascot: 24th October.
Woodford: 11th and 12th July.	Pomona: 21st and 22nd November.
Wellington Point: 14th July.	Millaa Millaa: 23rd and 24th November.
Caboolture: 19th and 20th July.	
Mount Gravatt: 21st July.	
Barcaldine: 24th and 25th July.	
Rosewood: 25th and 26th July.	

Answers to Correspondents.

The Use of Arsenic as a Grass Killer on Tennis Courts.

J.E.M. (Garget, Mackay)—

The Agricultural Chemist, Mr. J. C. Brünnich, states that arsenic will not kill the grass permanently, and the treatment will have to be repeated about once a year. Ten pounds of arsenic dissolved with 3 lb. of caustic soda will only make about 50 gallons of spray. Diluting it to 200 gallons would make far too weak a solution. There is no danger to health from the fumes on the court, but horses or cattle might lick the soil or eat the killed grass, and should therefore be kept off.

Hide Tanning.

J.R.C. (Goranba)—

The Director of Agriculture (Mr. H. C. Quodling) advises—

All vessels used in connection with tanning operations should be of wooden or other non-metallic substances. Hides may be tanned either freshly, flayed, or in a salted condition, but stored hides should be kept from heating.

To dehair hides.—Take 6 to 8 lb. of freshly burnt lime in a half-barrel and gradually slake; when slaked add up to 2 gallons of water. Shake the hide to remove all salt, trim thoroughly; and, if of large size, split down the back to facilitate handling. Soak hide, flesh side out, in clean water, suspending the hide on sticks for two or three hours, stirring frequently. After soaking, lay them on a beam hair side up; scrape and scrub well; reverse and remove all flesh off it. Scrape well with the back of a butcher's knife; resoak. Greenhide requires twelve to fourteen hours and salted hides twenty-four to forty-eight; scrape again with a butcher's knife. A "beam" consists of a piece of timber about 2 feet wide and 8 feet long, planed and placed in a sloping position from waist high to about 12 inches above the ground.

Place lime water prepared as above in the barrel previously used for soaking the hide and nearly fill with water; immerse the hides in this till the hair will rub off easily with the palm of the hand. Keep the solution frequently stirred and covered.

Place the hide on the beam and scrape off all hair; if sufficiently soaked a cheesy or curly layer will rub off with the hair. Scrape flesh side as well to remove as much lime as possible. Soak the hide in a barrel of water, to which has been added 9 oz. of 22 per cent. tannery lactic acid or half a gallon of vinegar; soak for twenty-four hours; wash with clean water and soak over night.

The tanning solution should be prepared fifteen or twenty days before the actual operation. Take 30 lb. to 40 lb. finely ground wattle or mangrove bark to 20 gallons hot water; cover and stir frequently. Strain liquor into the barrel and add water to nearly fill it; add 2 quarts vinegar. Soak hides in this solution, stirring and moving them frequently.

Prepare a second lot of tanning solution in the same manner, and when the hides have coloured nicely, remove 5 gallons of the old tan and substitute 5 gallons of the new tan, and add another 2 quarts of vinegar. Repeat this operation every five days, omitting the vinegar. After thirty-five days, add 30 lb. to 40 lb. finely ground bark moistened with hot water; stirring well in order to cover the hides with bark. After six weeks' soaking with continual stirring, half-empty the barrel and fill up with finely ground bark. After two months the hide should be thoroughly tanned. Rinse and rub out all the tan water with a stiff brush and "sticker"; the latter is a piece of brass 6 inches by 4 inches let into a piece of wood along one edge, and is used in a similar manner to that of a scraper. When the hide is damp, but not wet, coat well with neatsfoot or cod oil, hang up and let dry slowly. When dry, damp again and apply a mixture of tallow and neatsfoot, in equal parts, boil and apply warm; dry the hides and sprinkle with sawdust to remove any oiliness.

Land Measurement.

5 L.H. (Torrens Creek)—

The plot, 172 yards by 120 yards, measures 4 acres 1 rood 2 perches and $9\frac{1}{2}$ square yards.

Photographs for Reproduction.

J.G. (26-Mile Creek, Warra)—

The subjects are good, but the prints are not suitable for reproduction. We would much prefer to take our own prints off the negatives. Send them along, and, if desired, we shall return them to you after use. Photographs of suitable rural subjects are always welcome. Thanks.

Syphoning of Acid.

L.M. (Kingaroy)—

Your inquiry was referred to the Agricultural Chemist, Mr. J. C. Brünnich, who advises—

It is always difficult and even dangerous to start a syphon by suction, and it is far better to use pressure. Simply get a large rubber stopper to fit neck of jar tightly, make two holes, one to take the syphon tube, and the other fit with a small piece of glass or metal tubing, to which a bicycle pump can be attached; or even blowing by mouth will start the syphon.

Pig Fattening.

C.N.S. (Clifton)—

Your question, asking how much cracked wheat you will need to feed with butter-milk for fattening pigs was referred to the Agricultural Chemist, Mr. J. C. Brünnich, who advises:—

“A pig 100 lb. live weight requires for fattening a ration containing—

	Dry matter.	Proteins.	Carbohydrates.
1 gallon of butter-milk or skim milk supplies	3.6 lb.	.5 lb.	3.2 lb.
4 lb. of crushed wheat ..	1.0 lb.	.38 lb.	.92 lb.
	2.2 lb.	.30 lb.	1.30 lb.
	<hr/> 3.2 lb.	<hr/> .68 lb.	<hr/> 2.22 lb.

So that the ration would be rather high in proteins and low in carbohydrates, and the ration should be supplemented by giving a few pounds of sweet potatoes, pumpkins, and mangels, &c.”

Weeds for Identification—*Tribulus terrestris*, Caltrop; *Polygonum aviculare*.

F.B. (Goomeri)—

The weeds submitted were identified by the Government Botanist, Mr. C. T. White, F.L.S., as follows:—

- (1) *Tribulus terrestris* Caltrop., a very bad weed. It is an annual plant and dies down after seeding. The only method of eradication is to cut close down to the ground at the main root before the seeds ripen. The seed-head takes the form of a nasty burr. In South Africa the weed has been proved to poison sheep and goats. It is only apparently poisonous in a fresh stage, feeding experiments with dried plants and even with quite recently cut ones giving negative results.
- (2) *Polygonum aviculare*.—Knot weed or knot grass. A bad weed in cultivation, but contains no deleterious properties. Hoe cutting before the seed ripens is the only satisfactory method of eradication.

Pumpkin and Melon Seeds as Food for Stock and Poultry.

G.E. (Nambour)—

The Director of Agriculture, Mr. H. C. Quodling, replies—It is not known that these seeds are harmful to stock but should not be fed to fowls. Mr. J. C. Brännich, Agricultural Chemist, advises as follows:—Pie melon have only a very low feeding value, and are poorer than pumpkins. Pie melons contain 94 per cent. of water and only $\frac{1}{2}$ per cent. of protein, and 4 per cent. of carbohydrates. According to American reports the seeds contain much nutriment and should not be wasted. Pigs eat them readily; they act as a vermifuge, freeing the animals of worms and putting the digestive organs in good order. As the seeds are rich in protein and oil, eating in excess may cause digestive disturbance. The seeds of pumpkins are reported harmful to fowls, and melon seeds probably act likewise.

A Good Potato Return. Sugar Beet in the Granite Belt.

S.H.H. (Thulimba)—

- (1) A return of 7 tons of sound potatoes from 8 cwt. of seed saved locally from last crop is a very satisfactory one, and very much above the average yield throughout Queensland, and even of Tasmania. Your return shows that, given proper attention, satisfactory and payable potato crops can be grown in your district.
- (2) Sugar beet growing can only be profitably conducted where large areas are planted within reach of an up-to-date sugar-mill. There is very little likelihood of the industry being established in the Stanthorpe district. Sugar beet, no doubt, could be grown in your locality, and, probably, if selected varieties were planted and cultivation carried out on right lines, a high sugar content would be obtained; but, as already stated, unless the industry is carried out on a large scale, it is quite unlikely to become a commercial success. At the same time, should you wish to grow sugar beet for pigs or other farm stock, it would, no doubt, form a useful addition to animal rations.

Ophthalmia in Poultry.H.F.H. (Bambaroo, *viâ* Townsville)—

The Poultry Instructor, Mr. J. Beard, advises—Besides the different eye inflammations, such as coryza, chicken pox, and diphtheria, there is another kind of ophthalmia due to minute worms which live under the nictating membrane. In this disease the eyes are watery, become inflamed, and at times the bird loses its sight. The worms are whitish or semi-transparent. The females either lay eggs in the eyes or are carried through the tearduct to the mouth and thence get into the intestines, where their bodies dissociate and the eggs are liberated, the latter are expelled in the stools and hatch on the ground. The larvæ of these worms live on wet ground for a certain time and get into the eyes of other birds when they take their usual dust bath. This disease is not widely spread, but assumes a serious character where it occurs. It can be easily kept in check by treating the birds and disinfecting the run with a strong solution of disinfectant. Any of the following treatments will be found beneficial:—

- (1) Instil a few drops equal parts of tincture of Aloes and water three times daily; after three or four days the worms become absorbed.
- (2) Instil a few drops one part Argyrol to ten parts water once a day for three or four days.
- (3) Place your thumb on the base of the beak, then use pressure working your thumb gradually towards the corner of the eye; by so doing the worms will all be pressed out in one cluster. Wash clean and dry the eye and then instil a few drops of kerosene.

By following the foregoing instructions the worms should soon be eradicated.

Farm and Garden Notes for June.

FIELD.—Winter begins on the 24th of this month, and frosts will already have been experienced in some of the more exposed districts of the Southern coast and on the Darling Downs. Hence insect pests will, to a great extent, cease from troubling, and weeds will also be no serious drawback to cultivation. The month of June is considered by the most successful lucerne-growers to be the best time to lay down this crop, as any weeds which may spring up in the event of a dropping season will be so slow-growing that the young lucerne plants will not be choked by them.

The land should now be got ready for millets, sorghums, panicum, &c. Oats, barley, vetches, clover, tobacco, buckwheat, field carrots, and Swedes may now be sown. Some advocate the sowing of early maize and potatoes during this month, but obviously this can only apply to the more tropical parts of Queensland. The land may be got ready, but in the Southern districts and on the tableland neither maize nor potatoes should be planted before August, or at the earliest, in warm early districts, at the end of July. There is always almost a certainty of frosts, more or less severe, during these months. Arrowroot will be nearly ready for digging, but we would not advise taking up the bulbs until the frosts of July have occurred. Take up sweet potatoes, yams, and ginger. Should there be a heavy crop, and consequently a glut in the market, sweet potatoes may be kept by storing them in a cool place in dry sand, taking care that they are thoroughly ripe before digging. The ripeness may be known by the milky juice of a broken tuber remaining white when dry. Should the juice turn dark, the potato is unripe, and will rot or dry up and shrivel in the sand pit. Before pitting, spread the tubers out in a dry barn or in the open, if the weather be fine. In pitting them or storing them in hills, lay them on a thick layer of sand; then pour dry sand over them till all the crevices are filled and a layer of sand is formed above them; then put down another layer of tubers, and repeat the process until the hill is of the requisite size. The sand excludes the air, and the potatoes will keep right through the winter. Late wheat may still be sown, but it is too late for a field crop of onions. In tropical Queensland the bulk of the coffee crop should be off by the end of July. Yams may be unearthed. Cuttings of cinnamon and kola-nut tree may be made, the cuttings being planted under bell glasses. Collect divi-divi pods and tobacco leaves. English potatoes may be planted. The opium poppy will now be blooming and forming capsules. Gather tilseed (sesame), and plant out young tobacco plants if the weather be suitable. Sugar-cane cutting may be commenced. Keep the cultivator moving amongst the pineapples. Gather all ripe bananas. Fibre may be produced from the old stems.

Cotton crops are now fast approaching the final stages of harvesting. Growers are advised that all cotton in the Central District should be consigned to the Australian Cotton-growing Association, Rockhampton; whilst those in the Southern areas should consign their cotton to the Association at Whinstanes, Brisbane. All bags should be legibly branded with the owners' initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus the address labels.

KITCHEN GARDEN.—Cabbage, cauliflower, and lettuce may be planted out as they become large enough. Plant asparagus and rhubarb in well-prepared beds in rows. In planting rhubarb it will probably be found more profitable to buy the crowns than to grow them from seed, and the same remark applies to asparagus.

Sow cabbage, red cabbage, peas, lettuce, broad beans, carrots, radish, turnip, beet, leeks, and herbs of various kinds, such as sage, thyme, mint, &c. Eschalots, if ready, may be transplanted; also horse radish can be set out now.

The earlier sowings of all root crops should now be ready to thin out, if this has not been already attended to.

Keep down the weeds among the growing crops by a free use of the hoe and cultivator.

The weather is generally dry at this time of the year, so the more thorough the cultivation the better for the crops.

Land for early potatoes should now be got ready by well digging or ploughing.

Tomatoes intended to be planted out when the weather gets warmer may be sown towards the end of the month in a frame where the young plants will be protected from frost.

FLOWER GARDEN.—No time is now to be lost, for many kinds of plants need to be planted out early to have the opportunity of rooting and gathering strength in the cool, moist spring time to prepare them for the trial of heat they must endure later on. Do not put your labour on poor soil. Raise only the best varieties of plants in the garden; it costs no more to raise good varieties than poor ones. Prune closely all the hybrid perpetual roses; and tie up, without pruning, to trellis or stakes the climbing and tea-scented varieties, if not already done. These and other shrubs may still be planted. See where a new tree or shrub can be planted; get these in position; then they will give you abundance of spring bloom. Renovate and make lawns, and plant all kinds of edging. Finish all pruning. Divide the roots of chrysanthemums, perennial phlox, and all other hardy clumps; and cuttings of all the Summer bedding plants may be propagated.

Sow first lot, in small quantities, of hardy and half-hardy annuals, biennials, and perennials, some of which are better raised in boxes and transplanted into the open ground, but many of this class can, however, be successfully raised in the open if the weather is favourable. Antirrhinum, carnation, picotees, dianthus, hollyhock, larkspur, pansy, petunia, *Phlox Drummondii*, stocks, wallflower, and zinnias, &c., may be sown either in boxes or open beds; mignonette is best sown where it is intended to remain. Dahlia roots may be taken up and placed in a shady situation out of doors. Plant bulbs such as anemones, ranunculus, freesias, snowflakes, ixias, watsonias, iris, narcissus, daffodils, &c. Tulips will not suit the Queensland climate.

To grow these plants successfully, it is only necessary to thoroughly dig the ground over to a depth of not less than 12 in., and incorporate with it a good dressing of well-decayed manure, which is most effectively done by a second digging; the surface should then be raked over smoothly, so as to remove all stones and clods, thus reducing it to a fine tilth. The seed can then be sown in lines or patches as desired, the greatest care being taken not to cover deeply; a covering of not more than three times the diameter of larger seeds, and a light sprinkling of fine soil over small seeds, being all that is necessary. A slight mulching of well-decayed manure and a watering with a fine-rosed can will complete the operation. If the weather prove favourable, the young seedlings will usually make their appearance in a week or ten days; thin out so as to leave each plant (if in the border) at least 4 to 6 in. apart.

Orchard Notes for June.

THE COAST DISTRICTS.

The remarks that have appeared in these notes for the past two months apply in a great measure to June as well, as the advice that has been given regarding the handling, grading, packing, and marketing of the citrus crop still holds good. As the weather gets cooler the losses due to the ravages of fruit flies decrease, as these insects cannot stand cold weather, and consequently there is only an odd one about. The absence of flies does not, however, permit of any relaxation in the care that must be taken with the fruit, even though there may be many less injured fruit, owing to the absence of fruit-fly puncture, as there is always a percentage of damaged fruit which is liable to speck, which must be picked out from all consignments before they are sent to the Southern States, if a satisfactory return is to be expected. If the weather is dry, citrus orchards must be kept in a good state of tilth, otherwise the trees may get a setback. Old worn-out trees can be dug out and burnt; be sure, however, to see that they are worn out, as many an old and apparently useless tree can be brought round and made to bear good crops, provided the trunk and main roots are still sound, even though the top of the tree is more or less dead. The whole of the top of the tree should be cut off and only the trunk and such sound main limbs left as are required to make a new head. The earth should be taken away from around the collar of the tree, and the main roots exposed, any dead roots being cut away and removed. The whole of the tree above ground and the main roots should then be dressed with a strong lime sulphur wash, or Bordeaux paste. The main roots should be exposed for some time, not opened up and filled in at once. Young orchards can be set out now, provided the ground is in good order. Don't make the mistake of planting the trees in improperly prepared land—it is far better to wait till the land is ready, and you can rest assured it will pay to do so in the long run.

When planting, see that the centre of the hole is slightly higher than the sides, so that the roots, when spread out, will have a downward, not an upward tendency; set the tree at as nearly as possible the same depth as it was when growing in the nursery, cut off all broken or bruised roots, and spread those that remain evenly, and cover them fine top-soil. If the land is dry, the tree should then be given a good watering, and when the water has soaked in, the hole can be filled up with dry soil. This is far better than watering the tree after the soil has been placed round it and the hole filled up. Custard apples will be ripening more slowly as the nights get colder, and if the weather becomes unduly cold, or if immature fruit is sent South, the fruit is apt to turn black and be of no value. This can easily be overcome by subjecting the fruit to artificial heat, as is done in the case of bananas its flavour. Grade custard apples carefully, and pack in cases holding a single layer of fruit only for the Southern markets.

Pineapples, when at all likely to be injured by frost, should be protected by a thin covering of bush hay, or similar material. The plantation should be kept well worked and free from weeds, and slow-acting manure, such as bone dust or island phosphates, can be applied now. Lime can also be applied when necessary. The fruit takes longer to mature at this time of the year, consequently it can be allowed to remain on the plant till partly coloured before gathering for the Southern markets, or can be fully coloured for local use.

Banana plantations must be kept worked and free from weeds, especially if the weather is dry, as a severe check to the plants now means small fruit later on. Bananas should be allowed to become full before the fruit is cut, as they will carry all right at this time of the year; in fact, there is more danger of their being injured by cold when passing through New England by train than there is of their ripening up too quickly.

Bear in mind the advice given with regard to the handling, grading, and packing of the fruit. It will pay you to do so. Land intended for planting with bananas or pineapples during the Spring should be got ready now.

Strawberries require constant attention, and unless there is a regular and abundant rainfall they should be watered regularly. In fact, in normal seasons, an adequate supply of water is essential, as the plants soon suffer from dry weather, or strong, cold westerly winds. Where not already done, vineyards should be cleaned up ready for pruning—it is, however, too early to prune or to plant out new vineyards.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

All kinds of deciduous fruit trees are now ready for pruning, and this is the principal work of the month in the orchards of the Granite Belt Area. Don't be frightened to thin out young trees properly, or to cut back hard—many good trees are ruined by insufficient or bad pruning during the first three years. If you do not know how to prune, do not touch your trees, but get practical advice and instructions from one or other of the Departmental officers stationed in the district. In old orchards do not have too much bearing wood; cut out severely, especially in the case of peaches, or you are likely to get a quantity of small unsaleable fruit. There are far too many useless and unprofitable fruit trees in the Granite Belt Area which are nothing more or less than breeding-grounds for pests, such as fruit fly, and are a menace to the district. Now is the time to get rid of them. If such trees are old and worn out, take them out and burn them, but if they are still vigorous, cut all the tops off and work them over with better varieties in the coming season—apples by grafting in spring and peaches and other stone fruits by budding on to young growth in summer. Planting can start now, where the land is ready and the trees are to hand, as early planted trees become well established before spring and thus get a good start. Be very careful what you plant. Stick to varieties of proved merit, and few at that, and give so-called novelties and inferior sorts a wide berth. Take the advice of old growers, and do not waste time experimenting with sorts that have probably been tested in the district, and turned down years ago. When land is intended for planting this season, see that it is well prepared and well sweetened before the trees are put in, as young trees seldom make a good start when planted in sour and badly prepared land.

Slowly acting manure—such as bonedust, meatworks manure, or island phosphates—can be applied now, as they are not liable to be washed out of the soil, and they will be available for the use of the trees when it starts growth in spring. Lime can also be applied where required. Badly-drained land should be attended to, as no fruit trees will thrive with stagnant water lying round their roots.

On the Downs and Tableland all kinds of fruit trees can be pruned now, and vines can be pruned also in any district where there is no danger from late frosts, and where this can be done the prunings should be gathered and burnt and the vineyard ploughed up and well worked to reduce the soil to a good state of tilth, so that should rain come it will absorb all that falls and the moisture can be kept in the soil by cultivation subsequently.

Citrus fruits will be at their best in the Western districts. The trees should be watered if they show signs of distress, otherwise all that is necessary is to keep the surface of the land well worked. All main-crop lemons should be cut by this time, as if allowed to remain longer on the tree they only become overgrown and are more suitable for the manufacture of peel, whereas if cut and cased now they will keep in good order so that they can be used during the hot weather.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1923.	APRIL.		MAY.		JUNE.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6.3	5.49	6.20	5.19	6.37	5.2
2	6.4	5.48	6.20	5.18	6.37	5.2
3	6.4	5.47	6.21	5.17	6.38	5.2
4	6.5	5.46	6.21	5.16	6.38	5.2
5	6.5	5.45	6.22	5.15	6.39	5.1
6	6.6	5.44	5.22	5.14	6.39	5.1
7	6.6	5.43	6.23	5.13	6.40	5.1
8	6.7	5.42	6.23	5.13	6.40	5.1
9	6.7	5.41	6.24	5.12	6.41	5.1
10	6.8	5.40	6.24	5.12	6.41	5.1
11	6.8	5.39	6.25	5.11	6.41	5.1
12	6.9	5.37	6.26	5.11	6.42	5.1
13	6.9	5.36	6.26	5.10	6.42	5.1
14	6.10	5.35	6.27	5.10	6.42	5.1
15	6.10	5.31	6.27	5.9	6.42	5.2
16	6.11	5.32	6.28	5.8	6.43	5.2
17	6.11	5.31	6.29	5.8	6.43	5.2
18	6.12	5.30	6.29	5.7	6.43	5.2
19	6.12	5.29	6.30	5.7	6.43	5.2
20	6.13	5.28	5.30	5.6	6.44	5.2
21	6.14	5.27	6.31	5.6	6.44	5.2
22	6.14	5.26	6.31	5.5	6.44	5.2
23	6.15	5.25	6.32	5.5	6.44	5.3
24	6.15	5.24	6.32	5.4	6.44	5.3
25	6.16	5.23	6.33	5.4	6.45	5.3
26	6.17	5.22	6.34	5.4	6.45	5.4
27	6.17	5.21	6.34	5.3	6.45	5.4
28	6.18	5.21	6.35	5.3	6.45	5.4
29	6.18	5.20	6.35	5.3	6.45	5.5
30	6.19	5.20	6.36	5.3	6.45	5.5
31	...	...	6.36	5.2	...	...

PHASES OF THE MOON, OCCULTATIONS, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer" Time is not used.

- 1 April ○ Full Moon 11 10 p.m.
 8 " ☾ Last Quarter 3 22 p.m.
 16 " ☾ New Moon 4 28 p.m.
 24 " ☾ First Quarter 3 20 p.m.

Perigee on 2nd at 7.21 a.m., and 30th at 6.24 p.m.

The Full Moon will be apparently very near to Saturn and Spica on the nights of April 1 and 2.

On the 19th the Moon in Crescent form will pass Mars soon after Sunset.

On Sunday, 29th April, an interesting Occultation of Saturn will take place about 5 p.m., Saturn reappearing about 6 p.m. Saturn will also be Occulted on 26th May, about Midnight.

- 1 May ○ Full Moon 7 30 a.m.
 8 " ☾ Last Quarter 4 18 a.m.
 16 " ☾ New Moon 8 38 a.m.
 24 " ☾ First Quarter 12 25 p.m.
 30 " ○ Full Moon 3 7 p.m.

Apogee on the 13th, at 2.48 p.m.

Perigee on the 29th, at 1.48 a.m.

Jupiter will be in opposition to the Sun at Midnight on the 5th, when it will be nearly overhead.

Mercury being at its greatest eastern elongation about the 5th should be visible between the Pleiades and Hyades soon after Sunset.

- 6 June ☾ Last Quarter 7 19 p.m.
 14 " ☾ New Moon 10 42 p.m.
 22 " ☾ First Quarter 6 46 a.m.
 28 " ○ Full Moon 11 4 p.m.

Apogee on the 10th, at 4.30 a.m.

Perigee on the 25th, at 11.30 p.m.

About an hour before Sunrise on the 12th the Moon in Crescent form and the beautiful planet Venus will afford a fine celestial picture somewhat low down in the East with the Pleiades north of them.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 3 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

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QUEENSLAND AGRICULTURAL JOURNAL

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JUNE, 1923.

PART 6.

Event and Comment.

The Current Issue.

Much interesting matter will be found in this issue, including the conclusion of the series of articles on the organisation of the agricultural industry in Queensland dealing particularly with agricultural education. The conference of dairy factory managers, one of the notable agricultural events of the month, has focussed attention on the importance of dairying, second only to sugar, to Queensland; and a report of the proceedings, together with the first of a series of papers dealing with various phases of the industry and which were read at the conference, contains much of interest to dairymen, as well as to those engaged in the manufacturing and merchandising of dairy products. Other features include a progress report of the entomologist specialising on the Banana Beetle Borer pest (Mr. John L. Froggatt, B.Sc.), an announcement of Federal Sugar Policy, and a continuation of a summary of experiments carried out by the Bureau of Sugar Experiment Stations. Other regular features cover a wide field, and are excellently illustrated.

Plant Resources for Motor Fuel.

The ever-increasing use of internal combustion engines, both for transport and other agricultural purposes, adds to the general demand for fuel. It becomes necessary, therefore, to take stock of every possible source of supply, and the question of utilisation of vegetation and plant residues is of considerable technical and economic importance. The gradual depletion of crude petroleum accentuates this fact, and a digest of the most recent literature on the subject contained in the "International Review of the Science and Practice of Agriculture" (N.S., Vol. 1, No. 1, p. 208, Jan.-Mar., 1923) is most valuable at the present time. Experiments on a large scale have been in progress in the United States, Philippines, and Cuba to ascertain the comparative values of alcohol from various sources, and it is estimated that the Nipa palm (*Nipah fructicans*, Wurm.) and "blackstrap" molasses offer the cheapest and most easily manipulated and valuable sources of power alcohol. As a motor fuel, especially for internal combustion engines, alcohol possesses certain outstanding advantages; the combustion is marked by cleanliness and freedom from any carbon deposit; alcohol is "softer" than benzine, and the running of the engine is smoother; alcohol stands high initial compressions without knocking, and permits the use of available horse-power of a definite size of motor to be greater than when petrol is employed; lubrication difficulties are not likely to occur; so far no corrosion

has appeared in the valves and no acids in the exhaust. Difficulties such as low-heating value will be overcome in due course if certain practical points are observed:— (1) Alcohol is more efficient in engines of low piston and long stroke; (2) the circulating water should be kept as hot as possible; (3) the inlet air should be well pre-heated; alcohol will not vapourise at ordinary temperatures; (4) high cylinder temperatures are required; (5) the jet orifice should be enlarged so as to increase the fuel supply about 50 per cent.; (6) metal carburettors should be used. As to cost, the digest gives a clear statement of the cost of an alcohol motor fuel plant producing 1,000 gallons per day (these figures were derived from the result of practical experience in the erection and operation of numerous distilling plants in the Philippines), as follows:—£5 labour, plus £16 (approx.), fuel, plus £6 (approx.), interest, depreciation, and other charges. In this case, cane molasses was the sole source of alcohol, and the figures give a general idea of the cost and value of molasses as fuel. The comparative low cost of production, as proved by the experiments and operations, suggests the practicability of turning the Queensland molasses production into a more economical account on a scale larger than has hitherto been attempted.

Egg Pool Ballot.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has announced that the referendum in connection with the proposed egg pool was 550 votes in favour of the pool and 70 votes against. Action will accordingly be taken to submit to the Executive Council a minute for the creation of the proposed pool. It may be stated that this pool will apply to all owners of 100 fowls or over in that part of Queensland east of a straight line drawn from Bundaberg to Goondiwindi.

The vote for the Egg Board resulted as follows:—

District No. 1 (roughly from Caboolture to Bundaberg)—

Harold Gowen, of Glass House Mountains	65 votes.
Edwin Alfred Smith, of Maryborough	48 votes.

District No. 2 (North Brisbane as far as Caboolture)—

Percival Rumball, of the Gap, Enoggera	91 votes.
Jas. Stevingstone Kerr, Eagle Junction	64 votes.

District No. 3 (South Brisbane, Wynnum, and Cleveland)—

Matthew Hale Campbell, of North Pine	86 votes.
William Hindes, of Manly	38 votes.

District No. 4 (roughly, West Moreton and the Logan)—

Henry Moreton Stevens, of Lancfield	Unopposed.
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District No. 5 (roughly, the Darling Downs)—

Charles Edward Smith, of Toowoomba	Unopposed.
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Opossum Trapping—Flashlights Prohibited.

The Animals and Birds Act specifically prohibits the use of flashlights in opossum hunting, and this prohibition is in line with similar practice in other countries where furred animals are economically valued. It is well known that the use of flashlights is even more effective in opossum extermination than cyanide, and the use of both is prohibited under heavy penalties. Moreover, the use of flashlights causes serious losses to stockowners, by disturbing and startling cattle on the runs. Last year the loss was so serious in some districts as to compel stockowners to remove their cattle from opossum country. Users of these lights are also considered to be a nuisance to legitimate opossum-trappers, and the Minister for Agriculture and Stock (Hon. W. N. Gillies) has announced that the prohibition of flashlights will be rigorously enforced during the current open season.

Taking Technical Education to the Country.

In furtherance of its scheme for the extension of the domestic science system, the Department of Public Instruction is having two travelling cars constructed at the Ipswich railway workshops. The Minister for Public Instruction (Hon. John Huxham) has completed a plan for extending technical education to country districts by means of these cars and an efficient instructional staff. In the course of a recent announcement Mr. Huxham stated that the cars would be completely fitted for domestic science class purposes, and they would travel over the railways in areas not now served by technical colleges or rural classes. One of the cars would be used for the region west of Roma on the Southern and Western line, and the other would be run on the western section of the Great Northern system, which extends from Townsville. When the link between Longreach and Winton was built a car would also serve that stretch of country. It was intended that these cars should be switched into sidings at selected centres, remaining there for six weeks, during which intensive instruction would be given in dressmaking, millinery, cookery, and similar activities associated with domestic science. Altogether, the project was well advanced towards its practical application.

The Value of Attention to Detail.

The recent butter and cheese exhibition by the Dairy Factory Managers' Association in Brisbane provided some interesting and instructive examples of how not to do things. The great bulk of the exhibits were products of perfect manufacture and presentation, but the Director of Dairying, Mr. E. Graham, detected several little faults that marred an otherwise excellent display. One box of butter was distinctly rancid on the surface, though a sample from the middle of the box showed it to be a first-class product. The deterioration in the surface butter was due to the careless way in which the paper had been folded on the top of the box, allowing an air pocket between the paper and the butter. This air had oxidised the surface of the butter and caused the deterioration in flavour. Another entry had been sent in a second-hand box of very dirty appearance. Mr. Graham pointed out that the factory which had sent it in had a reputation for producing a very high class butter, had its own box factory, yet, to save a few pence, had used a box which had ruined the product.

Control of the Cotton Industry.

Communications received by the Department of Agriculture and Stock indicate that there is a feeling among some cotton-growers that the Government is losing control over the industry. The exact position is set out in a letter from the Under Secretary (Mr. E. G. E. Scriven) to a Local Producers' Association in one of the cotton regions.

In that communication Mr. Scriven pointed out that instead of losing control the Government, on the contrary, was moving rather towards tightening its powers of control, and at present was the holder, under the proclamation of the Governor in Council, of all cotton in Queensland. It was quite possible that that power would be accentuated during the next session. The Under Secretary further pointed out that the instructional staff was being added to as the need arose, and everything was being done to place the industry upon a sound foundation. The connection with the British-Australian Cotton Association was one of agency only. The Cotton Association merely ginned and sold on behalf of the Government, and had no right or title in the resulting raw cotton, which was the property of the Government on behalf of the growers. The association could not depart from the terms of the agreement made for that purpose.

The Cinema in Agricultural Education.

The use of moving pictures in agricultural education has been suggested in the old country, and a society interested in rural progress has entered on the preparation of a set of films. A perusal of French exchanges also indicates an acceptance of the idea in agricultural circles in France, and the Ministry of Agriculture has authorised an annual grant of 500,000 francs for the purpose of installing in agricultural colleges and schools in the rural communes cinematographic apparatus for use in popularising scientific agriculture. In Italy, the use of films for agricultural propaganda has also been largely developed. There the authorities are concerned with technical agricultural instruction and improved crop yields; the films are lent free of charge (except for cost of carriage) to all agricultural bodies who make application for their use. In Germany also, attention is being given to the possibilities of film instruction; and with the great agricultural advance foreshadowed in Queensland there is no doubt that the use of fitting films on farming subjects will, in due course, be considered.

Progressive South Burnett.

For a district only about fifteen years old, from the viewpoint of closer settlement, the South Burnett, which embraces that rich stretch of scrubland stretching from Nanango to Boubyjan, has made extraordinary strides along the road of agricultural and commercial progress. In spite of occasional dry spells its advance has been both rapid and solid. Dairying, maize-growing, and pig-raising have been its staples, but now cotton is also coming into its own as a substantial wealth winner. Another source of district richness is the high value of the personal equation. Peopled by settlers from the older farming communities in West Moreton, Fassifern, and the Southern States, who knew how to make the best of the raw material, in the form of rich virgin country, the South Burnett simply had to move forward. A notable feature of its agricultural life is the practical interest taken in herd improvement. Probably no other agricultural district in Australia possesses so many stud stock establishments, and at the annual shows at the district's main centres—Nanango, Kingaroy, Wondai, and Murgon—may be seen some of the finest breeding stock in the State. Another notable feature of local progress is the number of farms connected by telephone with the business centres. For evidence of agricultural progress generally, the South Burnett, as a comparatively newly settled district, would be hard to surpass in the Commonwealth.

ORGANISATION OF THE AGRICULTURAL INDUSTRY IN QUEENSLAND—IV.

By J. D. STORY, Chairman Administrative Committee, Council of Agriculture; and
J. F. F. REID, Editor of Publications, Department of Agriculture and Stock.

In the first article of this series, published in the March Journal, the American Farm Bureau Organisation was described and compared with the plan of the Queensland Producers' Association. In the second instalment, which appeared in the April Journal, various phases of American marketing methods, relating more particularly to fruit, but capable of more or less diversified application, were discussed. The third article (May) was a continuation of the series and dealt with primary producers' marketing problems and co-operation generally. This article concludes the series, and covers generally agricultural organisation, education, and extension; and discusses the applicability of tested modern methods to Queensland conditions.—Ed.

AGRICULTURAL EDUCATION.

Its Organisation and Co-ordination.

In previous articles we have dealt with organisation, marketing, and co-operation as applied to agriculture and have endeavoured to draw helpful conclusions from the experience of farmers in other countries. Now that the primary producers of Queensland are organised in the Queensland Producers' Association, it remains to be considered whether in the solution of their problems they can be assisted by Agricultural Education; and, if so, how such education may be provided so as to reach, not only the farmers of to-morrow, but also those of to-day who would be willing to avail themselves of study if reasonable facilities were provided.

One of the most popular of modern slogans is "Organise, organise." But in the union of educational institutions with the agricultural industry the watchwords should be "Educate and organise." A new era seems to be dawning for the man on the land, the woman on the land, the child on the land. Australians as a whole are beginning to realise as they have never realised before how much Australia depends upon her primary industries; city folk are awakening to the general disabilities, the ups and downs of the land folk; conviction is growing that the country dweller is just as much entitled to his share of world goods as is the town dweller; more and more is it being felt that insecurity should be replaced by reasonable stability. As for the primary producer himself, more and more is he determined to have a larger share in the management of his business. In that determination right is on his side; and it is just here that education comes in. Contrast the preparation for town occupations with the preparation for purely land occupations. For the skilled trades, there are trade schools, technical college classes, and a fairly well-developed form of apprenticeship; for commercial occupations, there are the secondary schools, technical college classes, and the Commercial Junior Examination of the University; for the professions—medical, legal, engineering, church, &c.—there is liberal provision, either wholly or in part. Excepting, however, Gatton College and a few Rural Schools, there is little provision for the specialised preparation for the land occupations. If the land man desires to take as intensive a part in the management of matters pertaining to the land as the city man takes in matters pertaining to the city, the land man will have to be as carefully prepared and trained as the city man is. Especially will this be so in the case of the leaders. Thus agricultural education must play its part, and hence will be understood the inner meaning of the watchwords—"Educate and organise."

Consider for a moment the miscellaneous knowledge which land men should have—for example: Knowledge of soil selection; timber selection; farm planning; building construction and trade work generally; herd selection; properties of foods; cultivation methods; first-aid; and the care of plants and animals, including the treatment of diseases. Consider also the positions which they are called upon to fill as leaders in the rural communities—shire councillors, school committee men, members of local producers' associations and district councils of the Council of Agriculture, directors of co-operative trading concerns—such as butter factories, supply associations, market associations. Keeping all these things in view, an adequate scheme of agricultural education should provide a means whereby the future farmers, and

particularly the leaders of the agricultural industry and those State and other officials whose occupations bear directly upon rural pursuits, may be educated suitably. The bridge of education must span the abyss between "unskilled" and "skilled."

AMERICAN AGRICULTURAL EDUCATION.

In the United States of America, the Colleges of Agriculture have taken a leading part in the development of the agricultural industry and in the training of agricultural experts, officials, and practical agriculturists. The College of Agriculture of the University of California may be regarded as a typical American College of Agriculture. That college has three functions—namely, research, resident instruction, and extension. The college offers curricula designed for various purposes—

- (a) To train for the pursuit of farming.
- (b) To train for responsible positions as teachers in agricultural colleges, investigators in experiment stations, for extension work in agriculture, and for service in the United States Department of Agriculture.
- (c) To train for technical positions in industries closely allied to agriculture.
- (d) To train for the teaching of agriculture in the high schools.
- (e) To develop a recognition of public service.

The college offers over 200 courses of instruction in technical subjects besides opportunity to select subjects from the scientific and literary offerings of other colleges of the University.

The College.

The headquarters of the college are at Berkeley, a city of 67,000 inhabitants, distant thirty-five minutes from San Francisco by train and ferry, and twenty-five minutes by tram from the business centre at Oakland. The site contains 530 acres (including an experimental farm of 30 acres), and in the vicinity there are many establishments dealing in the products of agriculture—canning and preserving factories, slaughter-houses, dairy manufacturing plants, &c. There are also opportunities for studies in marketing by reason of the large population and the necessarily large amount of food transported from the great agricultural sections near by. Within easy reach also there are several thousand acres of hardwoods and other timbers.

On account of the insufficient area of land at headquarters for practical farming operations, however, it has been found necessary to establish a "College Farm" at Davis (65 miles distant from Berkeley), where an area of 780 acres has been permanently secured and an additional 300 acres are leased. The distance between the two establishments has proved a hindrance, and it has become necessary to arrange that students taking certain courses shall spend certain portions of their time at Davis and the remainder at Berkeley. To provide for scientific and other academic work of the students while at Davis it has also become necessary to duplicate to some extent the laboratories and University equipment.

Berkeley is regarded as the headquarters of the divisions of agricultural education, agronomy, citriculture, entomology, forestry, farm management, genetics, landscape gardening, nutrition, plant nutrition, plant pathology, pomology, rural institutions, soil technology, veterinary science, and viticulture. Laboratories are in existence in connection with the work of eleven of these divisions.

The Farm School.

At Davis there are numerous buildings for instruction in various phases of agriculture and horticulture, including chemistry, dairy industry, horticulture, soils and irrigation, poultry and veterinary science buildings; two stock judging pavilions; agricultural engineering shops; barns and sheds for horses, dairy and beef cattle, sheep, milk goats, swine, and poultry; one concrete silo and seven wooden silos.

The more important breeds of various classes of farm animals are kept and used in class work, feeding of cattle being an important part of animal husbandry work. A well-equipped poultry farm is stocked with several thousand fowls of a number of leading varieties.

A large acreage is devoted to investigations with field crops, 150 acres of orchards and vineyards yielding valuable data in various phases of fruit culture and furnishing actual practice in spraying, pruning, budding and grafting.

There are ample areas for growing vegetables, and the college has a modern irrigation system.

Farming interests in the vicinity are diversified—commercial orchards and vineyards, fields of miscellaneous grain crops, and pure bred stock farms.

Davis is regarded as the headquarters of the divisions of agricultural engineering, animal husbandry, dairy industry, irrigation practice, olericulture and poultry husbandry; but, as stated previously, work connected with several other divisions is also undertaken as a part of the Berkeley courses.

RESIDENT INSTRUCTION.

Degree Work.

The degree work involves four years' resident instruction, the last year being spent in the University of California. There are seven curricula leading to the degree of Bachelor of Science—

The Agricultural Science Course is primarily for the training of investigators in agricultural science and students intending to engage in institutional work either teaching or administration. Students who take agricultural science as their major course may specialise in one or more of such branches as entomology, fruit products, or soil technology.

The Agronomy Course offers a thorough and comprehensive training in the principles and practices underlying the production and utilisation of field forage crops, to meet the needs of students who plan to engage in farming as well as those who plan to pursue the teaching profession or engage in scientific work.

The Animal Industries Courses are intended to give the student a knowledge of farm machinery and buildings, all classes of livestock and their diseases, and the manufacture and testing of dairy products.

The Forestry Courses include training for—

- (a) Forestry generally (not engineering).
- (b) Management of forests and open grazing lands.
- (c) Forest and logging engineers.
- (d) Sawmill engineers and specialists in the manufacture and use of products made from wood.

The Horticulture Course deals with propagation and culture of flowers, vegetables, and all kinds of fruit plants, and the harvesting and marketing of their crops. The course is sufficiently elastic to meet the requirements of students preparing themselves for teaching or investigation in horticulture and for those who desire to engage in the actual production of crops.

The Landscape Gardening Course offers instruction (both technical and practical) to those who desire to become professional landscape artists and to others who may wish to become familiar with the fundamentals of the art of landscape design in order to become capable superintendents of construction.

The Rural Social Economics Course is designed to give students the necessary preliminary training for service in the spheres of Farm Management, Co-operative Marketing, Rural Organisation, Land Settlement, Agricultural Extension, and Agricultural Teaching in High Schools.

Non-Degree Work.

The non-degree work is offered at the branch of the College of Agriculture, Davis, to students who have reached the age of eighteen years and who have not the requirements to enter degree work. The courses, which are primarily practical, are:—

A three-year course for persons eighteen years of age or older who have had the equivalent of a Grammar School education.

A two-year course for High School graduates who do not care for a thorough training in the fundamental sciences and cultural subjects required for a degree.

A one-year course for young men who can spare only that amount of time to increase their earning power.

A large proportion of the work is done in laboratory, field, shop, and stable, but a student cannot secure the benefit of practice without earnest study of textbooks, publications, and lecture notes.

The purpose of the courses is to increase the earning power of young men in agricultural work by better fitting them for the operation of their own enterprises or for some definite position as trained, skilled employees; to broaden their understanding of the sciences underlying the production of plant and animal products;

to familiarise them with the best farm practice and the economic laws of business; and to cultivate a knowledge of those influences which make for good citizenship.

Major work is offered in animal husbandry, dairy industry, horticulture, and poultry industry—the one-year course in horticulture, for example, including—General pomology, soils, entomological practice, rural and personal hygiene, irrigation, field crops, orchard and garden pests, and certain elective subjects.

Short Courses.

Short courses and conferences of farmers at Berkeley and at Davis are also arranged to enable persons, especially those of mature years and experience, to acquire a knowledge of the fundamental principles of agriculture and of the results of the latest investigations in the production of fruit, field and forage crops, and live stock of various classes. The short courses are also open for those without experience but who wish to engage in some line of agriculture, to obtain theoretical and practical instruction that will prove of the greatest value to them in their farming operations. These courses, which are of one or two weeks' duration, include—General agriculture, poultry husbandry, deciduous fruits, dairy manufactures, land settlement and colonisation, fruit products, and bee-keeping.

RESEARCH WORK.

In the matter of agricultural research the Federal Government of the United States provides certain funds for experimental work, and the State Governments also contribute. The results of the investigations are published in bulletins and circulars which are sent free to those farmers who desire to have them.

The State Department of Agriculture conducts little, if any, experimental work, but confines its attention to regulatory and legislative measures. Research is conducted by the University—its well-equipped laboratories, numerous field plots, and comprehensive library offering ample facilities. Special post-graduate work in tropical agriculture has been organised at the Riverside Graduate School of Tropical Agriculture and Citrus Experiment Station which has an area of 477 acres in the centre of the citrus region, and ample laboratories. Here the primary function is research and no regular lectures are given.

As an example of what is being done at the University laboratories it may be sufficient to cite the work in connection with fruit products laboratories at Berkeley. These laboratories are equipped for the semi-commercial production of canned and dehydrated fruits and vegetables, jellies, fruit juices, preserves, &c., and the bacteriological and chemical examination of these products. In addition there is located at the branch at Davis a commercial dehydrating plant in which practice in dehydration is afforded.

At a Californian Convention of Fruitgrowers, Mr. Frank T. Swett, President of the Californian Pear Growers' Association, in supporting the work of the Fruit Products Laboratories, stressing its usefulness to the industry, and urging more liberal financial support by the Legislature, said that in every line of fruit products there was need for preliminary investigation and work, and that the one place for the best investigation was the Fruit Products Laboratory of the University of California; the results obtained there were worth twenty, thirty, or forty times what that laboratory had ever cost the State; the staff did not solve all the problems; they made the preliminary investigations; then the commercial men getting in touch with them, got their fundamental data and built commercial enterprises on the results of that preliminary work. Mr. Swett further pointed out that with the tremendous increase in the fruit industries it was necessary to train young men to deal with the problems, not only in the laboratory but also to go out into the manufacturing establishments and keep on solving them.

AGRICULTURAL EXTENSION SERVICE.

Agricultural extension work is accomplished through farm advisers, home demonstration agents, agricultural clubs, and correspondence. These agencies are striving to meet the demands of the people of California for the best scientific and practical information along agricultural lines.

The assumptions on which non-resident (or extension) work is undertaken is that the University has but two functions—the discovery and the diffusion of knowledge—and that the teaching should be done not only in the institution itself but wherever its agents can reach.

Farm Advisers.

The farm advisers, supervised in turn by extension specialists, are trained agriculturists who are able to make known to farmers and groups of farmers the results of investigations made in the laboratories and on the experimental stations of the University. The practice has been to organise farmers into community groups known as farm bureau centres which serve as media through which the farm adviser may work effectively in teaching and home demonstration. The organisation of farm bureaux has already been dealt with in a previous article and need not be detailed here. Having formed the groups it has been found necessary in order to make definite progress year by year to lay down definite programmes of work, and each year the farm bureau centres lay out a definite plan for the following year. These programmes are rigidly adhered to, and have vitalised the farm bureaux movement, and greatly increased the efficiency of the extension work in agriculture.

Home Projects and Agricultural Clubs for Juniors.

The home projects and agricultural clubs are inaugurated on the assumptions that many boys and girls wish to make money by farming, that the agricultural institutions have information which will help farmers to increase their profits, and that the chances of success are increased when several persons in a neighbourhood undertake the same work.

The home farm provides special advantages, inasmuch as it affords opportunity for a boy to gain experience in the application of farming principles which he learns at school. It enables him to practise the farming processes which he sees demonstrated, and it utilises equipment already at hand.

School and home, parent and teacher, are brought into close relationship, and this serves as a check on the instruction given by the teacher. Under such circumstances that instruction must be practical, and of local application.

The home project is intended to throw the boy on his own resources and develop his power of initiative, as well as give increased knowledge and skill in farming methods.

Financial profit is the definite aim of all such projects, as it is the aim of farming business as a whole. The aim may be that of immediate profit, as in the case of a production project, the object of which is to produce most efficiently at a minimum cost; or it may be more remote, as in the case of an improvement project, such as the keeping of records of a dairy herd with a view to eliminating cows below standard. Whatever the project, economic development is emphasised as the final goal.

It is expressly contended that the function of such projects is not to investigate or indulge in research, but to illustrate known processes the outcome of which are fairly well assured.

Correspondence Courses in Agriculture.

These courses are prepared for farmers, farm managers, suburban dwellers cultivating land, prospective settlers, and others desiring specific and detailed information on the production of farm crops and animals and on the conditions of successful agriculture.

The scheme embraces not only the sending out of reading matter, but also the answering of questions by each student, and the correction of such answers by the University. Personal contact with the student is thus maintained, and he is invited to ask questions regarding local or community problems, or on any points in the lesson or in regard to the subject studied which are not quite clear to him.

Under the scheme the first two lessons are sent to the student as a beginning, and when he has returned the answers to the first lesson the third lesson is sent, and so on until completion of the series.

So far as possible the courses are arranged so that each may be taken independently and in any order which the needs of the student may suggest; but where students plan to take several courses of related subjects, certain sequences may be advised.

The particular feature is that a student may enter upon any course at any time and receive the lessons as rapidly as he is able to master them.

Correspondence Study Clubs.

Where ten or twelve regularly enrolled students residing in the same locality are pursuing a certain course, and find it of mutual value to organise a study club and hold meetings at regular intervals under the leadership of one of their members or other person, such clubs are recognised by the University, and are given every possible help that may contribute to their success.

If requested, the University will occasionally send an instructor to visit any well-organised study club in which attendance of members indicates sustained interest.

At present there are thirty courses offered, and others are being prepared. Those courses include corn culture, dairy husbandry, swine husbandry, sheep husbandry, poultry husbandry, fruitgrowing, canning and preserving, and the business aspects of Californian agriculture. The following are examples of correspondence courses:—

Course in Dairy Husbandry.—Seventeen lessons, including lessons on selection of herd, herd sire, pure-bred dairy cattle, care of the heifer from breeding to calving, feeding, testing, diseases, composition and secretion of milk, Babcock test, sources of milk and cream contamination, separating, market milk production, butter-making, cheese-making.

Course in Poultry Husbandry.—Sixteen lessons, including lessons on general characteristics, classification, selection for vigour, selecting and laying out plant, hatching with incubator, hatching with hens, brooding and rearing of chicks, brooder-houses and feeding of chicks, poultry-house essentials, feeds, feeding, breeding, meat production, marketing.

GENERAL CONCLUSIONS.

A review of the foregoing and recent investigations in California show—

- (a) That in America a Department of Agriculture is regarded as a very desirable department in a University, particularly in a State which is mainly dependent upon the primary industries.
- (b) That the College of Agriculture should be the institution for the training of the agricultural experts of the State, and for those occupations on which a basic training in subjects pertaining to agriculture is desirable.
- (c) That the courses should include both practical and theoretical work.
- (d) That for the purposes of practical work an area of not less than 600 acres should be secured as an adjunct of a College of agriculture.
- (e) That such area, if it cannot be actually part of the University domain, should be within convenient reach of the University; it should be possible to reach it in not more than forty-five minutes by conveyance.
- (f) That agricultural experts consider it highly desirable that agricultural students should be in close touch with the University, so that they may be brought into direct contact with the University staff, with other students, and with University life generally.
- (g) That special courses should be arranged for those who do not desire to enter a full degree course in agriculture.
- (h) That the work of the Agricultural Extension Service—embracing the farm adviser, home demonstrations, home projects and correspondence tuition—is of very vital importance as an agency for the spread of agricultural education to persons who in ordinary circumstances would not have the opportunity of attending the University.

AGRICULTURAL EDUCATION IN QUEENSLAND.

That the Queensland University should take a leading part in the development of agriculture in Queensland is an oft-told tale. A personal investigation into the work done for agriculture by American Universities, however, induces one not only to tell the tale once more but to tell it again and again until words, words, words are translated into action; until something is attempted—something is done.

In 1913 the first Chancellor of the University (His Excellency the late Sir William McGregor), in a comprehensive memorandum on the subject of a Faculty of Agriculture in the Queensland University (afterwards printed and presented to Parliament), stated that by a Faculty of Agriculture is meant a Department of the

University that would embrace in its scope systematic courses of lectures and demonstrations, and conduct original research on all that concerns the pastoral, farming, and horticultural industries. It should cover every product we obtain from the soil; and, as soon as may be practicable, should also include fisheries.

Sir William also commented upon the vastness of the promising field that Queensland presents for the practical application of modern science in regard to the great industries connected with the products of the soil, and the endless variety of subjects for research that already exist, and that must always present themselves over such a great area—more than five and a-half times that of the United Kingdom—with practically endless diversities of soil, climate, water, and flora. He emphasised that it was, therefore, very clear that the creation of a Faculty of Agriculture in the Queensland University was much needed, and that perhaps no other country presented such a vast and magnificent field for its operation.

In August, 1916, the following resolutions were carried by the Senate of the University of Queensland:—

- (a) That, as the question of the primary industries is closely interwoven with post-war problems, and a good system of agricultural education will be helpful in the development and expansion of the primary industries of Queensland, it is desirable that agricultural education should be carefully organised and developed.
- (b) That a select committee be appointed to inquire into the matter and furnish a report to the Senate.

The committee was duly constituted, and Mr. J. D. Story was appointed as chairman. In the course of its report the committee stated that in determining the main principles on which a comprehensive scheme of agricultural education should be based the following fundamental considerations must be kept in view:—

- (a) That Queensland is essentially a State of primary industries.
- (b) That her future prosperity depends largely upon the adequate and efficient development of the primary industries.
- (c) That Queensland manufacturing agencies must perforce handle local raw goods, and hence the secondary industries cannot hope to prosper unless the primary industries are properly developed.
- (d) That amongst the primary industries, agriculture stands pre-eminent.
- (e) That it is from the primary industries that Australia will derive the greater part of her wealth; and, consequently, if the primary industries flourish, the huge burden of taxation, arising out of war loans and other loans, will be more easily met.
- (f) That a right conception of true Australian citizenship should embrace a knowledge of the economic conditions which are essential to the welfare of the country, and that the important place which agriculture occupies in Australian economies should be clearly recognised.
- (g) That those measures should be encouraged which tend to increase and popularise rural occupations, and thus not only lessen migration from country to town, but increase migration from town to country.
- (h) That agricultural education is a matter for State and University concern rather than private concern; and that it should be closely interwoven with the State system and with University schemes, and should not be a detached and isolated branch of education.

The committee submitted definite recommendations as to the action which it thought should be taken regarding agricultural education in the Primary Schools, Rural Schools, Secondary Schools, and the University, and concluded its report with this significant paragraph:—

“That, as the adequate development of the primary industries is dependent upon those engaged in the industries securing a fair and reasonable return for the expenditure of their capital and labour, and as our youth would be more inclined to enter upon those industries if there were reasonable prospects (apart from seasonal uncertainties) of their earning a fair living thereby, it becomes apparent that the question of the financial return is closely allied to any scheme of agricultural education, and that the evolving by the responsible authority of a system whereby this reasonable financial return will be secured to the primary producers becomes more than ever a question of urgency, and that the University, through its Department of Economics or otherwise, should render as much assistance as possible in this matter.”

RECENT DEVELOPMENTS.

Organisation of Producers.

Since that report was written the State has launched a scheme for the organisation of the agricultural industry, and there has been constituted—

- (a) A Council of Agriculture.
- (b) Nineteen District Councils.
- (c) Seven hundred Local Producers' Associations, with a membership of over 20,000 producers.

A District Agent for each of the nineteen districts constituted under the scheme will shortly be appointed, and in the exercise of his duties he will be required—

- (a) To act as secretary and administrative and advisory officer to the District Council.
- (b) To endeavour to stimulate and sustain in the members an active interest in the Queensland Producers' Association.
- (c) To ascertain the requirements of the district as a whole, and to assist in the preparation of definite programmes of work to be undertaken in each section of the industry.
- (d) To act as markets officer for the district, and to collect data in regard to the movement of products, ruling market prices, and the supply of and demand for products at various points.

Legislative Enactments.

Last session three important educational enactments were passed—

- (1) "*The Agricultural Education Act of 1922*," making provision for the constitution of a Board of Agricultural Education and for the establishment of Agricultural Schools in districts where the people are prepared to contribute one-third of the initial cost of the site, buildings, and equipment.
- (2) "*The University Site Act of 1922*," making provision for the enlargement of the University site at Victoria Park, and for other consequential purposes.
- (3) "*The University of Queensland Act Amendment Act of 1922*," making provision for increased endowment. By this Act it is provided that in addition to a permanent annual endowment of £20,000 for general purposes, "whenever the Senate shall, after the passing of this Act, receive from public subscriptions or donations, or private bequests or benefactions, any capital sum or sums of money for the purpose of founding and awarding research fellowships in matters of research not provided for at the passing of this Act, or for the furtherance or encouragement of research in such matters, or for other like objects, the Governor in Council may pay to the Senate, by way of endowment on such sum or sums of money so received as aforesaid but subject to such terms and conditions as the Governor in Council on the recommendation of the Senate may determine, such sum or sums of money out of the consolidated revenue, which is hereby appropriated for the purpose, as the Governor in Council may think proper, but not exceeding in any one year the sum of £1 for every £1 so received on capital account as aforesaid nor a total sum of £10,000 in respect of all such endowments."

University Activity.

Recognising that the time was opportune to further consider the question of agricultural education and as a result of his inquiries in California, Mr. J. D. Story recently submitted a memorandum on the subject to the Senate of the University, and the following resolutions were passed:—

- (a) That a site of sufficient area for the practical work of a Faculty of Agriculture be secured as soon as possible.
- (b) That, seeing that it is not practicable at the present time to establish a Faculty of Agriculture or a Department of Agriculture, steps be taken as soon as possible for the institution of a Diploma of Agriculture

(c) That a survey be made as to the directions in which the research work of the University could be extended, so as to include those matters of economic importance, to the primary industries and concerning which work is not being done by the Commonwealth Institute of Science and Industry, keeping in view—

(i.) The provisions of "*The University of Queensland Act Amendment Act of 1922*";

(ii.) The possibility of co-operation with the Council of Agriculture with a view to the Council's assisting financially in regard to research work which the Council might ask the University to undertake.

The matter of a site for practical work has since been met by the generosity of Dr. Mayne, who has made a gift to the University for agricultural purposes of a large area of land situated at Moggill, about 8 miles distant from Brisbane.

The questions relating to the establishment of a Diploma Course in Agriculture, and the survey as to the direction in which research work can be extended, are now in the hands of expert committees, who will report to the Senate in due course.

Education Department's Assistance.

At the suggestion of Mr. Story, the Minister for Education (Hon. J. Huxham) has recently initiated the home project scheme. Projects are actually in operation at several of the Rural Schools, and many teachers of primary schools situated in agricultural districts have written for detailed information regarding the working of the scheme.

It may reasonably be assumed, too, that action to establish Agricultural Schools under the Act of last session may develop, especially if the Government will appropriate certain funds each year for the establishment of such schools.

CONCLUSION.

With these things already in train it may be in the best interests of agricultural education if a more or less definite policy can now be determined—a policy that will have for its objects—

- (a) The awakening and retention of the interest of producers generally.
- (b) Provision for scientific investigation of rural problems.
- (c) Distribution of results of investigations and of known principles and processes, not only to students at schools and the University, but to as many as possible of the producers themselves.

A study of American methods suggests that any comprehensive policy of agricultural education should be made on the following assumptions:—

- (1) That most of the boys so educated should take up the work of agricultural production.
- (2) That a small percentage should pursue their studies in order to become experts or specialists in particular branches of agricultural science.
- (3) That many of the boys who will take up such education will already have some knowledge of farm practice as practised on the home farm, and consequently the instruction required must consist largely of scientific principles upon which farm operations are based—a thorough knowledge of which will enable the student to apply those principles more intelligently.
- (4) That any complete scheme should include, in addition to the ordinary school and college curricula, facilities for providing modern scientific information to those producers who desire to avail themselves of it, and to adults without farm experience who desire to take up farm work.

Accepting these assumptions as substantially correct, it will be necessary to have available for dissemination a fund of present-day agricultural information, complete in character and wholly applicable to Queensland conditions. Hence, as a starting point it may be necessary to complete a survey of the information available, and to have text-books or series of lessons prepared where the published information is either insufficient or unsuitable. When information of the right type is available schemes for its actual distribution may be definitely formulated.

AGRICULTURAL TRAINING IN SCHOOLS.

Assuming again that basic information can be made available on the subjects of most importance to Queensland producers, the distribution of that information might be made through various grades of schools, as under.

Primary Schools.

Curriculum to be much the same as at present, but with such modifications or amplifications as will permit of the teaching of rudimentary principles of agricultural science in country schools and the keeping of garden plots on a small scale to illustrate the principles taught.

Rural Schools.

As opportunity offers, the Rural School system to be extended in suitable localities in preference to purely secondary school "tops." The work to be undertaken in such Rural Schools to include a course of two and a-half years in such branches of art, science, and craft, as will constitute a course in agriculture corresponding to the Junior University Course in general education or the Commercial Junior Course in commercial education.

Agricultural Schools.

Agricultural Schools, as provided for in "*The Agricultural Education Act of 1922*," to be established in suitable localities; and a lead to be given by the establishment of one of these schools on the site at Zillmere as a demonstration or experiment school. The work to be undertaken in this school to include—

- (1) A junior course as suggested for the Rural School.
- (2) A senior course of two years which would constitute a course in agriculture corresponding to the Senior University Course of general education or the Commercial Senior Course of commercial education.

Gatton College.

The Agricultural College at Gatton to be reorganised in accordance with the suggestions of the Departmental Advisory Committee recently appointed.

University.

The University to establish an Agricultural Diploma Course bearing the same relation to agriculture as the Commercial Diploma Course bears to commerce, or the Engineering Diploma Course to engineering.

When conditions are favourable the University to consider the establishment of a Degree Course in agriculture as an extension of the Diploma Course.

So far as the Agricultural Schools are concerned, the number to be established must necessarily be limited, and they should only be established in such places where there seems to be a reasonable likelihood of their being permanently successful. Hence, as a preliminary step, there should be a survey by the Departments concerned regarding the places in which the establishment of these schools is fairly warranted.

To assist in the establishment of Agricultural Schools in localities where they are deemed necessary, consideration should be given to the desirableness of abolishing the one-third local contribution towards the cost of the site, building, and equipment of proposed schools, or at least to reduce the amount of the contribution to a proportion sufficient to prove the interest of the applicants.

Under such a scheme of agricultural education the progressive steps in the various schools might be as follows:—

- (a) Entry to the Rural School to be on the satisfactory completion of the work of the Fifth Class in the Primary School. Students then to proceed with what might be termed an Agricultural Junior Course extending over two and a-half years, and embracing certain subjects of general education, manual training, and agricultural subjects.

All holders of two and a-half year Secondary School Scholarships to have the option of taking up the Ordinary Junior, the Commercial Junior, or, where instruction can be provided, the Agricultural Junior Course.

- (b) Entry to the Senior Course at the Agricultural Schools to be on the satisfactory completion of the Junior Course. The Senior Course to comprise advanced work in general education (modified if necessary to meet the special requirements of agricultural students), manual training and farm practice, and agricultural science. Selection of courses having major work in one or more branches to be permitted.
- (c) At the conclusion of the Senior Course a certain number of scholarships to be awarded on lines similar to the Open Scholarships to the University, to enable students to proceed to University Diploma Course work. The scholarships to be of (say) two and a-half years' duration—two years to be spent at the University, in a Science Course, and six months at an approved State or University experiment farm, or at an approved private farm.

EXTENSION SERVICE.

In addition to the distribution of information through the ordinary school courses, an extension service might be developed by—

- (1) Home project schemes for Rural School pupils and ex-pupils of Primary Schools where supervision can be arranged. There might be a Departmental Supervisor, and each principal of a Rural School (or other teacher of such school) might act as a divisional supervisor. The objects of the scheme to be to encourage work at the home in accordance with principles and processes enunciated by experts.
- (2) Demonstration or field days at Rural Schools and Agricultural Schools, whereby the work in progress may be explained to parents and interested producers.
- (3) Evening lectures in agricultural science where sufficient numbers of adults are desirous of instruction.
- (4) Correspondence instruction in individual subjects or in groups of subjects for the benefit of producers who wish to take up agricultural studies but who cannot conveniently attend classes in those subjects.

It should be possible to organise this extension work through the Local Producers' Associations and other organisations of producers. The secretaries or officers of these associations should be the media through which all matters affecting agriculture may be brought suitably under the notice of producers in the locality.

RESEARCH WORK.

In order to provide the most reliable information for instructional purposes, and to better provide for the solution of rural problems, there should be a definite move in connection with research work—both as regards purely scientific research and the discovery of economic processes for the treatment of agricultural products. The former class of work could most conveniently be done at the University, and agricultural organisations and others interested in the scientific investigation of rural problems should be continually urged to contribute to the funds of the University which are set aside for that purpose—any such contributions to be subsidised by the Government as provided by "*The University Act Amendment Act of 1922.*"

The work involved in the investigation of special processes should be undertaken by the State Agricultural Chemist; and the Council of Agriculture, the State Trade Commissioner, and other bodies interested in the matter should contribute to the cost of such investigations and collaborate with the Agricultural Chemist in regard to the work to be undertaken. Such an arrangement would obviate undue duplication of staffs, buildings, and equipment, and would also obviate overlapping in effort on the part of the several bodies concerned.

The results of such experiments and of the work on experiment farms should be published in bulletin form, to be made available to Rural Schools, Agricultural Schools, and to any producer requiring them. The bulletins would also form a useful addition to the collection of Queensland agricultural information.

A practical and effective scheme of agricultural education is undoubtedly warranted in a land of primary production, such as Queensland. The Council of Agriculture, district councils, local producers' associations, and kindred organisations might assist in still further arousing the interest of producers to the necessity for strengthening this branch of education and of making good use of the facilities and opportunities which now exist for so doing. As a general rule, increased production will follow the efforts of well-trained producers; more profitable returns will surely follow a more highly organised agricultural industry. When these results are in process of achievement Queensland producers will then realise the true value of the watchwords—

"EDUCATE AND ORGANISE."

SUGAR: FIELD REPORTS.

The Northern Field Assistant (Mr. E. H. Osborn) reports under date 5th May, 1923, to the Director of the Bureau of Sugar Experiment Stations as follows:—

Bowen.

Exceedingly dry conditions prevailed in this area prior to my visit. Most of the growers had been attempting to keep the cane alive with the aid of their small pumping plants, but as the soil had not received any soaking during the normal wet season, the demand on these plants had been too much. The creeks and watercourses are all very dry and grass is very scarce at time of writing.

Proserpine.

Up to date the mill's record showed the following very scanty rainfall:—January, 5.40; February, 2.64; March, 4.75; April (to 10th), .88—or a total of 13.67 inches. Considering such a dry period, the cane looked very fair, but unless more favourable weather conditions intervene very soon, the prospects for this season are anything but satisfactory. Parts of the district had suffered very severely prior to the fall of rain early in this month.

At Banana Pocket, some July planted Badila, Green Goru, and Clarke's Seedling, stood out on their own. Mr. Thomas was cutting a block of Badila for plants that would give a tonnage of about 30 tons to the acre now. Some very good first ratoon (cut October) 24 B (Green Goru) and Badila on Mr. J. Smith's farm also looked very well.

Some 800 acres of the area, probably half each of scrub and forest, had been sold, and was being vigorously opened up by the new owners. Many inquiries are being made about 1,200 acres that are yet available.

Some of the scrub land being cleared is of excellent quality carrying a good depth of rich deep black soil, and mostly timbered with dense vines and soft wood timbers, making grubbing an easy matter after a couple of trash fires have burnt out the majority of the stumps.

Tramway communication by means of the line to connect the Pocket with the Government Railway at Thompson's Creek is well advanced.

Pests.—In the course of a visit paid to Kelsey Creek it was seen that grubs (helped very probably by dry weather conditions) had done a considerable amount of damage to some first ratoons (Badila and Goru) situated on a couple of low-lying alluvial flats. Owners say that the infestation this year is the worst experienced so far.

The general state of the pasturage is very good in the Proserpine area, but no creeks or watercourses are running yet.

Lower Burdekin.

The Pioneer and Kalamia areas were visited during the middle of April, the conditions at the time being woefully dry. The post office rainfall records at Ayr were:—January, .32; February, .12; March, .63; April (to 23rd), nil—or a total of 1 inch and 7 points. This scanty rainfall has necessitated continuous irrigation since the New Year. Such a constant drain upon the lagoons and underground waters has resulted in the water level being lowered in many places. Many fervent wishes were uttered by local growers for the Southern advocates of cheap sugar to have to put in such a season under similar conditions in the Burdekin area. Possibly, their views might change after a dry season or two. To make matters worse, the prospects of a large area of early planting for next year are remote, for to anyone a good strike means irrigating before planting, which is, naturally, a very expensive item to growers who have continually irrigated for the past three and a-half months. Moreover, nearly all the available water is required to keep the present crop alive until cutting time. Despite such bad conditions some very good irrigated cane was seen upon several farms. Probably, the cane on Dick's bank looks better as a whole than that on most of the areas. Some good Badila, H.Q. 426, N.G. 24, N.G. 24 B. and B. 208 were seen hereabouts. Several of these blocks had been manured with mixed manures, and looked very well indeed. Further away, on Mr. W. Payard's farm, a 15-acre block of April planted H.Q. 426 and 24 B. had been treated with 3 cwt. of mixed manure per acre, and was then being watered for the fourth time. This is a very good block of cane, some of the H.Q. 426 being of excellent growth. Mr. Payard green manures extensively, and out of a total of 34 acres, 12 acres have just been planted and look in splendid condition.

Pests.—Comment was made about the large quantity of beetles collected, principally adjacent to Plantation Creek. From inquiries it would seem that although grubs are quite bad enough, they are not very much worse than in previous years. Another pest doing a certain amount of damage to cane is the "white ant." One block of cane was spoken of as having had the misses planted up as many as three times, owing to damage caused by them. In a block of second ratoons at Jarvisfield (Badila) the writer saw among the stools many splendid looking sticks, but with dead tops. Upon investigation it was found that only the shell of the cane was left, the inside being completely eaten out from the bottom upwards, and where the inside was not quite destroyed the ants were there in great numbers.

Tractor power.—This has increased enormously in the Burdekin of late months. A large number are being used coupled up to 6-inch and even 8-inch pumps, and are giving great satisfaction in raising water for irrigation and ploughing purposes, more especially in ploughing over the irrigated ground quickly in order to plant up before the moisture gets away. Horse feed of all kinds is very scarce and difficult to obtain just now, and so the tractor again scores. At time of writing, the pasturage is very bad and all the swamps and holes are drying up rapidly.

Home Hill.

Only a very short visit was made to this part of the Burdekin, but the same dry conditions were prevailing there. Rather larger areas of land are, however, being irrigated, and planted for next year than were noticed on the other side of the river. Despite the gruelling times farmers are going through, some very fair crops of cane were noticed throughout the district. Some splendid standover Badila plant took the eye on Mr. V. Hansen's place, and some 25 acres of first ratoon H.Q. 426 and N.G. 24 looked very well on Messrs. Cannavan Brothers' considering the dry weather.

Manure had been used with these ratoons, and water, of course, kept up. Up the river some good crops were seen upon Messrs. Gibson, Horwood, and Stapleton's areas, respectively.

The former grower has one of the most uniform crops seen so far. He has 28 acres Plant H.Q. 426, N.G. 24, N.G. 24 B., which look good enough for a 40-ton crop, and some 20 acres of manured first ratoons that should run into a 25-ton crop.

Messrs. Stapleton and Horwood's crops are Badila, and, considering the backward state of the cane generally, show well.

Diseases.—Since my last visit to Home Hill, "top rot" has caused a certain amount of damage, and I am informed that in February certain blocks were rather badly affected, but in most effected a recovery as soon as water was laid on.

Weather conditions, although bad enough here, were rather better than Ayr, as the following figures to date (28th) show:—January, 1.93; February, .05; March, .10; April, 1.09—or a total of 3.19 inches. Nearly an inch fell on the 26th. Growers are very busy getting ready to plant, thankful even for this small relief.

The Southern Field Assistant, Mr. J. C. Murray, reporting to the Director of the Bureau of Sugar Experiment Stations under date 1st May, 1923, remarks:—

Eton.

In common with other places around Mackay, in the early part of April, the Eton district was badly in need of rain. Cane was looking very parched and considerably checked, but none was beyond recovery if rain came within a reasonable time. Numbers of growers were busy ploughing, and a few were planting, taking the chance of an extended drought.

Cane varieties growing and showing fair resistance to dry weather conditions included Q. 970, Q. 813, H.Q. 426, H. 146, D. 1135, Shahjahanpur No. 10, H. 109, E.K. 1, and 7R 428 (Pompey). Of these canes it is probable that 7 R 428 (Pompey), Q. 813, and Shahjahanpur No. 10 will give the best ultimate results.

The question of green manures as a means of restoring humus, adding moisture, and giving improved texture to the soil is interesting the growers more than heretofore, and this, combined with subsoiling, will be a feature in future seasons, if carried out, in giving these loams far greater drought resisting properties than they have at present. Samples of soil were taken for analysis, from typical loams.

Homebush.

Generally speaking, the foregoing remarks on Eton would apply to the Homebush areas. The district was very dry at the time of visiting, although cane had not been checked beyond recovery. Deep cultivation is necessary here, and it is probable that maize ploughed under or grown for grain as a rotation would be beneficial.

Cane varieties that have apparently shown the greatest resistance to the drought so far are Pompey, Q. 813, D. 1135, and H.Q. 285. The first-named variety is superior from a drought resisting point of view to the others and growers are recommended to try it.

Sarina.

This area is not quite so badly affected by the dry spell as many other places in the Mackay district. While there are blocks of badly checked cane, there are some farms on which good growth is being made, and where no serious checking is visible. A small amount of cane is affected with an unhealthy discolouration of the leaf, particularly D. 1135, but if the farmers observe careful plant selection, and in cases where the cane shows deterioration to change the variety, there is no occasion to suppose much cane will be affected. There is very little to comment on cane varieties since last visiting this area. H.Q. 426, Q. 813, and H.Q. 285 appear to be resisting the dry weather as well as is reasonably possible. The farmers here are recommended to change plants as much as they can, also to make a greater use of lime.

St. Helens.

The country between Hampden and St. Helens is, to a large extent, open forest, with considerable areas that would, if cleared, be accessible to the plough. The soil on the accessible portions of this tract is not rich, but a fair quantity is forest loam, heavily timbered with spotted gum, bloodwood, messmate, &c. This country is fairly well watered, with an average rainfall of about 60 inches. At the time of visiting, although there was a drought in Mackay, this area looked remarkably green, with plenty of fat stock in evidence.

Yeppoon.

A visit was made to this district for the purpose of giving settlers, if they required it, information as to the growing of cane in this area, and the milling facilities if any could be produced.

There is no cane being grown for sugar at Yeppoon just now, but from land that was inspected it is probable that 40,000 tons of cane could be produced annually. The greater part of the land capable of growing sugar was originally half forest and half scrub, but since the mill was shifted and cane growing lapsed some years ago, this has become covered with lantana. The average rainfall at Yeppoon is 60 inches. As far as could be seen there is nothing to prevent farmers from producing excellent cane in this district. Frost would be unlikely to seriously damage cane here. The farmers are advised to each plant, say, 5 acres of cane, and rail it to the nearest mill. Then, if their returns were favourable under the circumstances, and using them as a basis they might raise enough capital in the district to erect a mill capable of treating, say, 50,000 tons. It is probable that money spent in this way in the Yeppoon district would be well invested.

Woongarra and Springfield.

Good rains have fallen on these areas and the cane is again taking on a healthy, vigorous appearance. On the Woongarra areas there will probably not be a big crop, but there is every chance, with the open winter that promises, of a fair cutting. The cane for the greater part looks healthy, and is free from disease.

Varieties that are looking vigorous after the rain include Q. 1098, Q. 813, H.Q. 285, Shahjahanpur No. 10, E.K. 1, and 1900 Seedling. The Indian variety is making good headway in the estimation of numbers of farmers, and is looking healthy and vigorous. This cane is almost invariably affected with a harmless chlorosis which should not be confused with striped leaf disease. Careful observations of the last three years have proved it develops no secondary symptoms of "striped leaf."

At Springfield the farmers have a very fair chance of cutting a good crop. Their principal drawback here is haulage. A light tramline is badly needed. More green manuring is required here than is being carried out. The growers are also advised to experiment with lime and fertiliser. Q. 813 and 1900 Seedling are varieties that are looking well in this locality.

Avondale.

The prospects here are very favourable for a fair average season. The young plant cane is growing strongly, while the cane to be cut next season is doing well, and any that is taken off by next September should give a very fair yield. Q. 813 is doing remarkably well. M. 1900 and D. 1135 are also varieties that are making a fair showing. Up the river, at Tegege, there is very little cane at present, but the farmers are considering replanting. Varieties recommended to be tried are M. 1900, N.G. 24, Q. 813, H.Q. 285, E.K. 1, Q. 970, Q. 1098, and Shahjahanpur No. 10.

Summarising, the following would apply to the districts under review at Mackay—

Eton District.—Subsoiling and greater use of green manures. Greater amount of local experiment with fertilisers. Careful experiment with new varieties of cane.

Homebush District.—Greater amount of local experiment with fertiliser, as well as greater use of the facilities provided by the Bureau for soil analyses. Careful selection and changing of plants, subsoiling, and maize rotation.

Sarina District.—Greater use of lime. Careful selection of plants, and changing. More local experiment with fertilisers.

Generally speaking, the question of silos for the conservation of cane tops is one that ought to be considered by the farmers, especially those who have herds as well as sugar-cane.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations has received the following report dated 15th May, 1923, from the Entomologist at Meringa, Mr. E. Jarvis:—

SATISFACTORY PROGRESS OF EXPERIMENTS WITH PARA-DICHLOR. FOR CONTROL OF CANE-GRUBS.

Plots at Greenhills.

This experiment, which consists of half an acre of first ratoons (Badila) was treated on 16th February with $\frac{1}{4}$ oz. injections placed 1 foot apart, 2 inches from stools, and $4\frac{1}{2}$ inches deep on each side of rows, the cane being about 4 feet 6 inches high at the time of application. Check plots were left on two sides of the treated area, all plots being twenty-four rows wide (two chains) in order that the cane from each might ultimately be conveniently harvested and weighed separately.

Seven weeks later (6th March) cane in the check plots began to show signs of grub affection, and ten stools when examined yielded from one to six grubs per stool (average 3.7). All grubs collected were feeding within about 4 inches of the surface, mostly among the cane roots, some having commenced to eat holes in the basal portion of sticks. Large patches of this yellowing grub-eaten cane occurred in both of the check plots, while in the fumigated area there was no sign whatever of grubs, the cane being uniformly green and normal in appearance. Ten stools, however (those appearing backward in growth), were examined in various parts of this treated plot, but although the soil was searched to a depth of 1 foot not a single grub could be found. On 9th April, a second examination of ten stools (five treated and five checks) gave similar results, viz.—an average of about three grubs per stool in the checks, and none in the treated area. The soil in the latter plot was still impregnated with the fumigant, the odour from which was quite noticeable in unbroken subsoil at a depth of 18 inches. About $1\frac{1}{2}$ drachms of the $\frac{1}{4}$ oz. injections had evaporated during this interval of seven weeks, leaving half a drachm of each injection still operative in the soil. When last examined (seventeen days later) on 26th April, the cane throughout the treated area continued uniformly green and normal, the edge of the southern boundary of this plot contrasting quite noticeably in colour with the yellowing cane in a large grub-affected patch occurring in the adjoining check. At the present time (28th April) grub infestation at the corner of the block containing our experiment plots is mostly in patches of varying size, from 100 to 1,000 square feet, but as the season advances may extend more widely.

Later Experiment at Greenhills.

On the 11th instant, a small area of 66 feet by 25 feet, first ratoons Badila, damaged by third stage grubs of *albohirtum* was treated with $\frac{1}{4}$ oz. injections, placed 1 foot apart, about 4 inches deep, and close to stools, in order to obtain additional data with regard to the killing power of para-dichlor. under field conditions. During the fortnight following this application the weather happened to be rather showery, about 1.50 inches falling at Meringa between the dates 15th to 22nd April. Subsequent examination of these stools fifteen days after application yielded twenty grubs, eighteen of which were either dead or dying, only two being apparently unaffected. Several of the dead grubs, quite black and decomposed, were lying in hollows eaten into underground portions of canes, indicating that para-dichlor. probably exercises a paralysing effect, thus preventing the escape of grubs overtaken by the fumes.

Plots at Meringa.

The plots fumigated at Meringa on 25th January consist of first ratoons of D. 1135 growing on an area of volcanic soil usually infested each season. Injections of $\frac{1}{4}$ oz. of para-dichlor. were placed 6 inches deep, 4 inches from stools, and from 12 to 18 inches apart. The treated area of nearly half an acre consists of two strips 472 feet in length by 36 feet wide running along the summit of a ridge of high land that had been ploughed about 6 inches deep. The condition of the cane on these plots about a fortnight after injection was described in my February report (Australian Sugar Journal, vol. XV., p. 47, April, 1923). When next examined on 27th April (about three months after application) the cane, both on treated and check plots, was 7 to 8 feet high; but while the foliage of that on the fumigated area was dark green and of upright growth, the cane on adjoining check plots had turned more or less yellow in places owing to the presence of grubs. This was very marked on the strip where injections had been made 18 inches apart, which chanced to pass through grub-infested patches. Looking down on the plots from a height of 10 or 12 feet one could distinctly notice the green edges of the treated areas sharply bounded by the yellowing borders of the check plots. This occurred, of course, on portions where grubs happened to be working, but it was very encouraging to note that not a single yellow patch was present in the treated plots, which appeared of a uniform dark healthy green throughout their entire length.

Introduction of Grub Parasites into Java.

On the 28th of this month the first consignment of Queensland Scoliid digger-wasp parasites was forwarded to Professor S. Leefmans, Chief of Zoological Division, Institute for Plant Disease, and will leave Townsville, 8th May. This package contained twelve cocoons of our digger-wasps *Campsomeris tasmaniensis* and *radula*, which being spun within the last ten days should reach Buitenzorg before the wasps are ready to emerge from the cocoons. A second consignment more recently spun was forwarded on 1st May to catch the same boat, and these will be followed up by other lots until we succeed in introducing these parasites into Java, where it is hoped they may help to control the ravages of scarabæid grubs affecting cane and cassava crops, such as those of *Lepidiota stigma* Fad., *Leucopholis rorida* Fab., &c.

At the present time (2nd May) we have 190 paralysed grubs of *albohirtum* in our breeding trays, to which are attached either maggots or eggs of *Campsomeris* wasps in various stages of development.

In return for cocoons sent away we shall receive those of two species of scoliid parasites from Java for introduction into our canefields to wage war against grubs of the grey-back cane-beetle and of *Lepidiota frenchi*.

One of these wasps, *Dielis thoracica* F., attacks the grubs of four different scarabæid beetles. Its life-cycle occupies from forty-three to forty-eight days. In general it is confined to areas badly grub-infested in East Java and on the south coast of Sumatra, where it is found practically throughout the wet season and also during the dry monsoon of six months. In Java these wasps frequent honey-bearing flowers of the orders *Compositæ*, *Malacidæ*, &c., including those of genus *sida*, three species of which occur commonly around Meringa, and are habitually visited by our *Campsomeris* wasps.

Visit to Lower Burdekin.

Our inspection of the more serious cane pests of this district made last Month (March) was followed up—as promised to the canegrowers at Ayr—by a second visit undertaken on the 23rd instant, when field demonstrations regarding the use of carbon bisulphide as a soil fumigant for “white-ants” attacking cane, and its mode of application, were carried out by Mr. W. Cottrell-Dormer, my Entomological Assistant.

Owing to a continuance of dry weather many growers were unable to be present, being very busy irrigating their cane, but those who attended were well pleased with the results obtained by such fumigation.

Like most methods of control, prevention in this case is better than cure, as when termites have entered the sticks above ground level it is almost impossible to destroy them. The best time to treat this pest is shortly after planting, before the young shoots are more than 18 inches high. During this period of growth, any termites that may be in the soil will probably have discovered and surrounded the cane sets, and can then be killed by simply fumigating the rows with carbon bisulphides. This treatment should practically clean up the land, thus preventing any future attack on the standing crop. Since my recent visit to the Burdekin the value of para-dichlor. for destroying cane grubs has been clearly demonstrated by field experiments, and it would certainly be advisable to try its effect upon “white-ants.” We have not yet worked out the possibilities of poison-baits in this connection, but such method of control might prove serviceable during certain periods in the life-cycle of this pest.

Another phase of control which I hope to investigate is that of treatment of the sets before planting with some palatable solution, non-poisonous to handle, but fatal or repellant to termites.

A SUMMARY OF SOME EXPERIMENTS CARRIED OUT BY THE BUREAU OF SUGAR EXPERIMENT STATIONS.—VII.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, commenced this series in the May (1922) Journal, and in his opening article discussed deep cultivation experiments and tabulated comparative crop result from subsoiled and non-subsoiled fields. The second instalment, an account of results of irrigation experiments and the action of irrigation and manures upon the density and purity of sugar juices, appeared in the June (1922) issue. In the August number Mr. Easterby's notes covered experiments in fertilisation, and were followed in the succeeding issue by an account of distance experiments and resultant crops. In the October (1922) number the summary was continued with notes on the introduction and testing of cane varieties. In the February Journal experiments to determine if cane sets cut from arrowed canes have a prejudicial effect on the germination and subsequent yield were discussed. In his introduction to the Summary of Experiments above mentioned, the Director stated that a summary of the chemical work accomplished by the Bureau, to be prepared by Mr. George R. Patten, formerly Chief Chemist to the Bureau, would also be presented. Mr. Patten has now completed this summary, which entailed a great deal of elaborate work and occupied much time. The results will appear from time to time in the Journal until complete, when the whole summary will then be published in bulletin form.—Ed.

SOIL AND OTHER CHEMICAL ANALYSES—continued.

Summarised by GEORGE R. PATTEN, Analyst, Agricultural Laboratory, Brisbane, formerly Chief Chemist, Bureau of Sugar Experiment Stations.

The following summary includes Series II.—the Mackay Soils, and a part of Series III.—Bundaberg Soils.

It will be noticed that the full chemical names of soil constituents are given in the first table. In the remaining tables, in order to save space and time, the chemical symbols are used, but the layman can easily make these out on reference to the first table.

The lime content is much better on the average in these series of soils than they were in Series I.—Cairns Soils.

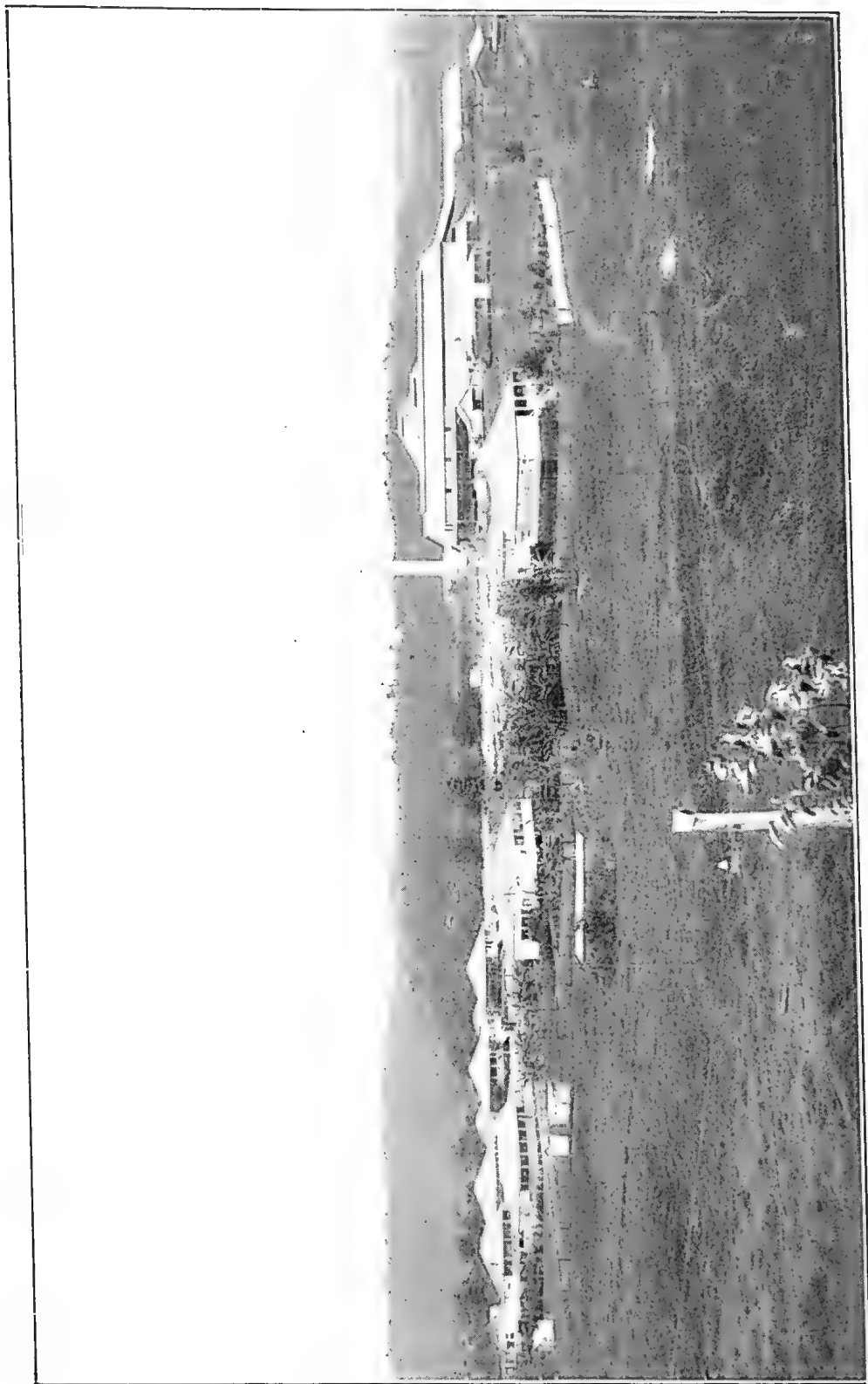


PLATE 109.—SOUTH JOHNSTONE CENTRAL SUGAR MILL.

SERIES No. II.
HOMEBUSH (MACKAY).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	86.85	..	..	..
Moisture	1.35	..	..	..
Combustible matter	4.25	..	4.30	..
Silica (SiO ₂) insoluble .. ..	..	78.71	69.29	72.41
Silica (SiO ₂) soluble .. ..	..	7.67	6.75	7.06
Phosphoric acid (P ₂ O ₅) .. ..	.19	.10	.29	.30
Chlorine (Cl.) .. ..	.004	..	.004	.004
Iron Oxide (Fe ₂ O ₃)	3.78	.54	4.30	4.49
Alumina (Al ₂ O ₃)	2.42	7.21	8.80	9.20
Lime (CaO) .. ..	.49	.84	1.24	1.29
Magnesia (MgO) .. ..	.24	.58	.75	.78
Potash (K ₂ O) .. ..	.16	1.72	1.68	1.75
Soda (Na ₂ O) .. ..	.24	2.23	2.21	2.31
	99.97	99.60	99.61	99.59
Acidic elements in the soils 79.77 per cent.				
Basic elements in the soils 19.82 per cent.				
Total nitrogen in the soils .. .. .074 per cent.				

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅) .. ..	.0013	39
Lime (CaO) .. ..	.0591	1,773
Potash (K ₂ O) .. ..	.0182	546

RIVER BANKS (MACKAY).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	81.61	..	..	..
Moisture	2.19	..	..	..
Combustible matter	5.87	..	5.94	..
SiO ₂ (insoluble) .. ..	..	72.35	60.38	64.22
SiO ₂ (soluble) .. ..	..	12.91	10.87	11.57
P ₂ O ₅ .. ..	.14	.22	.33	.35
Cl. .. ..	.004	..	.004	.004
Fe ₂ O ₃	3.76	.78	4.50	4.80
Al ₂ O ₃	4.95	8.71	12.37	13.16
CaO .. ..	.64	.68	1.22	1.30
MgO .. ..	.36	.31	.62	.65
K ₂ O .. ..	.15	1.43	1.36	1.49
Na ₂ O .. ..	.26	2.38	2.26	2.40
	99.93	99.77	99.85	99.94

Acidic elements in the soils 76.14 per cent.

Basic elements in the soils 23.80 per cent.

Total nitrogen in the soils093 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. per Acre.
Phosphoric acid (P ₂ O ₅) .. ..	.0014	42
Lime (CaO) .. ..	.0748	2,244
Potash (K ₂ O) .. ..	.0136	408

NORTH ETON.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
			Water-free Soil.	Mineral Matter.
		Insoluble in Hydrochloric Acid.		
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	85.99	..	..	..
Moisture	1.48	..	..	..
Combustible matter	4.51	..	4.58	..
SiO ₂ (insoluble) .. ..	..	75.25	65.68	68.82
SiO ₂ (soluble) .. ..	..	9.13	7.97	8.35
P ₂ O ₅ .. ..	.12	.21	.31	.32
Cl. .. ..	.003	..	.003	.003
Fe ₂ O ₃	3.70	.96	4.60	4.82
Al ₂ O ₃	2.85	8.47	10.29	10.78
CaO .. ..	.63	.81	1.35	1.41
MgO .. ..	.27	.25	.50	.52
K ₂ O .. ..	.20	1.85	1.82	1.90
Na ₂ O .. ..	.27	3.38	3.23	3.38
	100.02	100.31	100.33	100.30

Acidic elements in the soils 77.49 per cent.

Basic elements in the soils 22.81 per cent.

Total nitrogen in the soils075 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. per Acre.
Phosphoric acid (P ₂ O ₅) .. ..	.0009	27
Lime (CaO) .. ..	.0760	2,280
Potash (K ₂ O) .. ..	.0200	600

PLANE CREEK (FOREST LANDS).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
			Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	67·31	..	..	..
Moisture	4·05	..	..	..
Combustible matter	10·77	..	11·23	..
SiO ₂ (insoluble) .. ..	..	71·18	49·93	56·21
SiO ₂ (soluble) .. ..	..	19·70	13·82	15·55
P ₂ O ₅	·08	·19	·22	·24
Cl.	·003	..	·003	·003
Fe ₂ O ₃	7·42	1·04	8·46	9·52
Al ₂ O ₃	8·71	5·12	12·67	14·26
CaO	·78	·42	1·11	1·24
MgO	·49	·34	·75	·84
K ₂ O	·12	·36	·38	·40
Na ₂ O	·27	2·12	1·77	1·99
	100·00	100·47	100·34	100·25

Acidic elements in the soils 72·00 per cent.

Basic elements in the soils 28·25 per cent.

Total nitrogen in the soils ·178 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. per Acre.
Phosphoric acid (P ₂ O ₅)	·0016	48
Lime (CaO)	·1433	4,299
Potash (K ₂ O)	·0101	303

PLANE CREEK (SCRUB LANDS AND LOW FLATS).

Constituent Element.	Agricultural Analysis.	Insoluble Residuc.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble residuc	77.08	..	..	..
Moisture	2.28	..	..	..
Combustible matter	7.11	..	7.28	..
SiO ₂ (insoluble) .. ..	..	75.23	59.34	63.98
SiO ₂ (soluble) .. ..	..	13.70	10.80	11.65
P ₂ O ₅ .. ..	.11	.16	.23	.25
Cl. .. ..	.003	..	.003	.003
Fe ₂ O ₃	6.29	1.04	7.25	7.82
Al ₂ O ₃	4.83	7.25	10.66	11.50
CaO	1.43	.77	2.07	2.23
MgO .. ..	.57	.27	.80	.86
K ₂ O .. ..	.15	.40	.47	.51
Na ₂ O .. ..	.14	1.35	1.21	1.30
	99.99	100.17	100.11	100.10

Acidic elements in the soils 75.88 per cent.

Basic elements in the soils 24.22 per cent.

Total nitrogen in the soils130 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. per Acre.
Phosphoric acid (P ₂ O ₅) .. ..	.0014	42
Lime (CaO) .. ..	.1231	3,693
Potash (K ₂ O) .. ..	.0086	258

NORTH OF RIVER AND FARLEIGH.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	65.48	..	..	..
Moisture	4.83	..	..	..
Combustible matter	9.63	..	10.11	..
SiO ₂ (insoluble) .. .. .	..	61.97	42.61	47.31
SiO ₂ (soluble) .. .. .	..	21.42	14.73	16.39
P ₂ O ₅ .. .. .	.29	.29	.50	.55
Cl .. .. .	.01	..	.01	.01
Fe ₂ O ₃	6.48	2.82	8.75	9.73
Al ₂ O ₃	10.49	8.59	16.92	18.83
CaO	1.26	1.21	2.16	2.40
MgO .. .. .	.63	.34	.89	.99
K ₂ O .. .. .	.35	.70	.84	.94
Na ₂ O .. .. .	.38	2.81	2.33	2.60
	99.83	100.15	99.85	99.75

Acidic elements in the soils 64.26 per cent.

Basic elements in the soils 35.49 per cent.

Total nitrogen in the soils180 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. per Acre.
Phosphoric acid (P ₂ O ₅) .. .. .	.0013	39
Lime (CaO) .. .. .	.1456	4,368
Potash (K ₂ O) .. .. .	.0241	723

SUNNYSIDE (MACKAY).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	80.14	..	..	..
Moisture	2.33	..	..	..
Combustible matter	6.40	..	6.56	..
SiO ₂ (insoluble) .. ..	..	71.19	58.51	62.57
SiO ₂ (soluble) .. ..	..	13.22	10.80	11.58
P ₂ O ₅ .. ..	.18	.14	.26	.28
Cl .. ..	.008	..	.008	.008
Fe ₂ O ₃	2.97	1.86	4.60	4.88
Al ₂ O ₃	6.04	7.83	12.57	13.47
CaO .. ..	.88	1.08	1.78	1.91
MgO .. ..	.64	.71	1.22	1.31
K ₂ O .. ..	.23	.96	.99	1.06
Na ₂ O .. ..	.18	2.69	2.38	2.55
	99.99	99.68	99.67	99.61

Acidic elements in the soils 74.44 per cent.

Basic elements in the soils 25.17 per cent.

Total nitrogen in the soils170 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅) .. ..	.0011	33
Lime (CaO) .. ..	.0969	2,907
Potash (K ₂ O) .. ..	.0246	738

PROSERPINE.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble residue	75.52	..	..	..
Moisture	2.53	..	..	..
Combustible matter	8.23	..	8.45	..
SiO ₂ (insoluble) .. ..	..	61.67	47.84	52.20
SiO ₂ (soluble) .. ..	..	18.37	14.10	15.42
P ₂ O ₅ .. ..	.18	.13	.29	.31
Cl .. ..	.003	..	.003	.003
Fe ₂ O ₃ *	4.40	4.38	7.91	8.66
Al ₂ O ₃	7.32	7.67	13.45	14.70
CaO .. ..	.78	2.01	2.36	2.58
MgO .. ..	.70	.51	1.12	1.22
K ₂ O .. ..	.17	2.07	1.80	2.01
Na ₂ O .. ..	.15	3.11	2.60	2.82
	99.98	99.92	99.92	99.92

Acidic elements in the soils 67.93 per cent.
Basic elements in the soils 31.99 per cent.
Total nitrogen in the soils147 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅) .. ..	.0011	33
Lime (CaO) .. ..	.1277	3,831
Potash (K ₂ O) .. ..	.0330	990

BURDEKIN.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.		Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.	
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	
Insoluble matter	80.22	..	..	..
Moisture	2.34	..	..	..
Combustible matter	6.44	..	6.60	..	
SiO ₂ (insoluble) .. ..	..	70.11	57.62	61.67	
SiO ₂ (soluble) .. ..	..	14.97	12.29	13.16	
P ₂ O ₅ .. ..	.18	.03	.22	.23	
Cl .. ..	.004	..	.004	.004	
Fe ₂ O ₃	3.36	1.01	4.32	4.62	
Al ₂ O ₃	5.15	8.68	12.41	13.28	
CaO .. ..	.95	.73	1.58	1.69	
MgO .. ..	.73	.39	1.31	1.14	
K ₂ O .. ..	.34	1.47	1.58	1.70	
Na ₂ O .. ..	.15	2.68	2.35	2.51	
	99.86	100.07	100.28	100.00	

Acidic elements in the soils 75.06 per cent.

Basic elements in the soils 24.94 per cent.

Total nitrogen in the soils107 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅) .. ..	.0078	234
Lime (CaO) .. ..	.1650	4,950
Potash (K ₂ O) .. ..	.0344	1,032

SERIES No. III.
ISIS (LEVEL LANDS).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
		Per Cent.	Per Cent.	Per Cent.
Insoluble matter	55.51	..	..	..
Moisture	2.85	..	..	..
Combustible matter	11.39	..	11.72	..
SiO ₂ (insoluble) .. ..	..	48.78	27.89	31.57
SiO ₂ (soluble) .. ..	..	40.13	22.91	25.95
P ₂ O ₅ .. .. .	.24	.23	.39	.45
Cl. .. .. .	.004	..	.004	.004
Fe ₂ O ₃	13.26	2.65	15.11	17.12
Al ₂ O ₃	15.76	6.56	19.98	22.63
CaO .. .. .	.35	.17	.46	.53
MgO .. .. .	.30	.19	.43	.49
K ₂ O .. .. .	.18	.23	.32	.36
Na ₂ O .. .. .	.11	1.24	.83	.94
	99.95	100.18	100.04	100.04

Acidic elements in the soils 57.97 per cent.
Basic elements in the soils 42.07 per cent.
Total nitrogen in the soils189 per cent.

AVAILABLE PLANT SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅) .. ..	.0011	39
Lime (CaO) .. .. .	.1841	6,443
Potash (K ₂ O) .. .. .	.0197	689

ISIS (HILLSIDES).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
			Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	46.29	..	..	..
Moisture	2.96	..	..	..
Combustible matter	12.74	..	13.15	..
SiO ₂ (insoluble) .. ..	..	40.88	19.76	22.69
SiO ₂ (soluble) .. ..	..	45.98	21.71	25.05
P ₂ O ₅ .. .. .	.29	.16	.44	.50
Cl .. .. .	.003	..	.003	.003
Fe ₂ O ₃	17.43	3.17	19.48	22.45
Al ₂ O ₃	19.04	7.51	23.24	26.77
CaO .. .. .	.39	.20	.50	.57
MgO .. .. .	.26	.28	.40	.46
K ₂ O .. .. .	.16	.20	.26	.30
Na ₂ O .. .. .	.09	1.42	.77	.88
	99.65	99.80	99.71	99.67

Acidic elements in the soils 48.24 per cent.

Basic elements in the soils 51.43 per cent.

Total nitrogen in the soils183 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅) .. .. .	.0013	45
Lime (CaO) .. .. .	.0842	2,947
Potash (K ₂ O) .. .. .	.0161	563

WOONGARRA.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	45.40	..	..	..
Moisture	3.99	..	..	..
Combustible matter	13.95	..	14.52	..
SiO ₂ (insoluble) .. ..	..	32.71	15.51	18.13
SiO ₂ (soluble) .. ..	..	50.24	23.68	27.70
P ₂ O ₅ .. ..	.40	.17	.50	.58
Cl .. ..	.005	..	.005	.005
Fe ₂ O ₃	14.50	6.70	18.22	21.32
Al ₂ O ₃	20.61	8.61	25.46	29.78
CaO .. ..	.64	.27	.79	.93
MgO .. ..	.32	.22	.44	.51
K ₂ O .. ..	.14	.26	.27	.31
Na ₂ O .. ..	.12	1.01	.60	.69
	100.07	100.19	99.99	99.95

Acidic elements in the soils 46.41 per cent.

Basic elements in the soils 53.54 per cent.

Total nitrogen in the soils221 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅) .. ..	.0012	42
Lime (CaO) .. ..	.2554	8,939
Potash (K ₂ O) .. ..	.0234	819

BINGERA (RED SOILS).

Con-stituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble residue	69.21	..	..	..
Moisture	1.96	..	..	..
Combustible matter	8.39	..	8.56	..
SiO ₂ (insoluble) .. ..	..	73.31	51.75	56.58
SiO ₂ (soluble) .. ..	..	21.13	14.92	16.31
P ₂ O ₅ .. .. .	.20	.13	.30	.33
Cl .. .. .	.007	..	.007	.007
Fe ₂ O ₃	6.55	.80	7.24	7.92
Al ₂ O ₃	12.84	3.24	15.39	16.82
CaO .. .. .	.36	.20	.51	.56
MgO .. .. .	.18	.23	.34	.37
K ₂ O .. .. .	.19	.20	.33	.36
Na ₂ O .. .. .	.11	1.13	.91	1.00
	100.00	100.37	100.26	100.26

Acidic elements in the soils 73.23 per cent.

Basic elements in the soils 27.03 per cent.

Total nitrogen in the soils137 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅) .. ..	.0017	51
Lime (CaO) .. .. .	.1667	5,001
Potash (K ₂ O) .. .. .	.0208	624

WATAWA.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble residue	53.86	..	..	..
Moisture	3.55	..	..	..
Combustible matter	12.43	..	12.87	..
SiO ₂ (insoluble) .. ..	..	76.14	42.33	48.59
SiO ₂ (soluble) .. ..	..	13.91	7.86	9.01
P ₂ O ₅ .. ..	.19	.11	.25	.29
Cl .. ..	.002	..	.002	.002
Fe ₂ O ₃	13.31	3.24	15.66	17.96
Al ₂ O ₃	15.50	3.89	18.28	20.98
CaO .. ..	.35	.27	.52	.59
MgO .. ..	.41	.22	.55	.66
K ₂ O .. ..	.16	.28	.31	.36
Na ₂ O .. ..	.09	1.90	1.15	1.32
	99.85	99.96	99.78	99.76

Acidic elements in the soils 57.89 per cent.

Basic elements in the soils 41.87 per cent.

Total nitrogen in the soils185 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅) .. ..	.0010	30
Lime (CaO) .. ..	.1279	3,837
Potash (K ₂ O) .. ..	.0207	621

GIN GIN (FOREST LANDS).

Con-stituent Element.					Insoluble Residue.	Absolute Analysis.	
	Agricultural Analysis.				Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.				Per Cent.	Per Cent.	Per Cent.
Insoluble matter				67.96	..	..	..
Moisture				3.46	..	..	..
Combustible matter				8.71	..	9.03	..
SiO ₂ (insoluble)	70.95	49.95	54.92
SiO ₂ (soluble)	16.11	11.34	12.47
P ₂ O ₅ .. ..				.17	.03	.20	.22
Cl .. ..				.003	..	.003	.003
Fe ₂ O ₃				7.93	2.39	9.89	10.88
Al ₂ O ₃				10.06	7.08	15.40	16.94
CaO .. ..				.68	.59	1.22	1.34
MgO .. ..				.56	.22	.73	.81
K ₂ O .. ..				.18	.63	.63	.69
Na ₂ O .. ..				.19	1.62	1.34	1.47
				99.90	99.62	99.73	99.74

Acidic elements in the soils 67.61 per cent.

Basic elements in the soils 32.13 per cent.

Total nitrogen in the soils126 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅) .. ..	.0015	45
Lime (CaO) .. ..	.1292	3,876
Potash (K ₂ O) .. ..	.0145	435

GIN GIN (RIVER FLATS).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	74.59	..	..	..
Moisture	3.09	..	..	..
Combustible matter	7.33	..	7.57	..
SiO ₂ (insoluble) .. ..	..	72.95	56.15	60.76
SiO ₂ (soluble) .. ..	..	10.19	7.84	8.49
P ₂ O ₅ .. ..	.23	.06	.28	.30
Cl .. ..	.002	..	.002	.002
Fe ₂ O ₃	5.59	.86	6.43	6.96
Al ₂ O ₃	6.84	11.15	15.64	16.92
CaO	1.01	.62	1.52	1.64
MgO .. ..	.76	.32	1.03	1.12
K ₂ O .. ..	.34	.97	1.10	1.19
Na ₂ O .. ..	.21	2.71	2.30	2.49
	99.99	99.83	99.86	99.87

Acidic elements in the soils 69.55 per cent.
 Basic elements in the soils 30.32 per cent.
 Total nitrogen in the soils150 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅) .. ..	.0091	273
Lime (CaO) .. ..	.1793	5,379
Potash (K ₂ O) .. ..	.0262	786

BIRTHAMBA.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Soluble matter	74.29	..	..	..
Moisture	1.13	..	..	..
Combustible matter	7.85	..	7.67	..
SiO ₂ (insoluble) .. ..	..	76.52	57.49	62.26
SiO ₂ (soluble) .. ..	..	16.89	12.69	13.74
P ₂ O ₅ .. ..	.21	.02	.22	.24
Cl .. ..	.004	..	.004	.004
Fe ₂ O ₃	5.67	1.25	6.68	7.23
Al ₂ O ₃	10.26	4.13	13.48	14.60
CaO .. ..	.26	.19	.41	.44
MgO .. ..	.22	.17	.35	.36
K ₂ O .. ..	.08	.22	.25	.27
Na ₂ O .. ..	.08	1.15	.94	1.02
	100.05	100.54	100.18	100.16

Acidic elements in the soils 76.24 per cent.

Basic elements in the soils 23.92 per cent.

Total nitrogen in the soils149 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P ₂ O ₅) .. ..	.0005	15
Lime (CaO) .. ..	.1280	3,840
Potash (K ₂ O) .. ..	.0290	870

PEST OF THE COTTON FIELDS.*

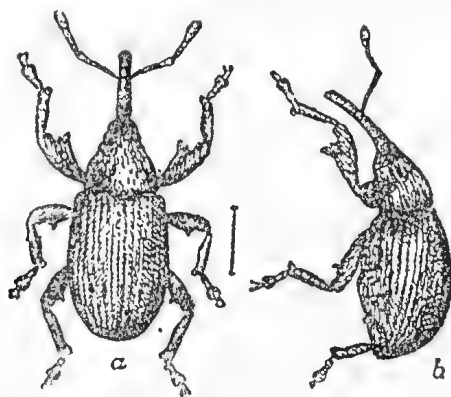
FIGHTING THE BOLL WEEVIL MENACE—FRESH STUDIES BY AMERICAN AUTHORITIES—THE CALCIUM ARSENATE METHOD OF DESTRUCTION.

At no time since the boll weevil first appeared in the United States has so much attention and systematic effort been given to its extermination as is now being devoted to that problem by the cotton-growing interests.

Thirty years ago the Mexican boll weevil crossed the southern border. Its advance was rapid. The Department of Agriculture records that before ten years had passed it was spreading at the rate of 5,640 square miles annually. From 1901 to 1911 the annual increase in the infested territory averaged 26,880 square miles. In 1916 it reached 71,800 square miles. At the end of 1921 over 600,000 square miles of territory had been affected by the boll weevil, or practically 85 per cent. of the cotton belt. The annual direct loss through non-production of cotton lint and seed is officially estimated at over £40,000,000. In 1921 more destruction was wrought on the cotton crop by the boll weevil than by any other pest. The damage was equivalent to one-third of the potential production.

Many attempts to combat the pest have been made by the Department of Agriculture and other interests. There is little doubt that the growers in many cases have not been enthusiastic about the matter when their crops seemed likely to be sufficiently large to bring about a fall in the price of cotton. A more far-sighted policy has, however, now commended itself, and as the result of elaborate experiments it has been established that the best means of eradicating the boll weevil is to dust the cotton plant at night with calcium arsenate. The dew becomes impregnated with arsenic, and the weevils are poisoned by drinking it. In the case of 237 farms the average yield per acre when dusted with calcium arsenate amounted to nearly 300 lb. of seed cotton more than the average yield from the undusted sections of the same farms.

The adult boll weevil is about one-fourth of an inch long, with a breadth of about one-third of the length. This measurement includes the snout, which is approximately half the length of the body. In colour it progresses from light-yellow to grey or nearly black. The illustration on this page is about five times the natural size. The



a—Boll weevil from above. b—Same from side, five times natural size.

boll weevil is generally most active from 9 a.m. to 5 p.m., during which period of the day 65 per cent. of its eggs are deposited. Nature assists in destroying the boll weevil, particularly in a hot dry season. Mortality during the winter also is very high.

Most energetic efforts are being made by the Government to induce the planters to adopt the calcium arsenate method. Several bulletins have been issued by the Department of Agriculture, while films have been made and are issued free of charge in order to instruct in the proper methods of poisoning and the results that can be produced.

Fresh studies of the influence of various factors in the control of the boll weevil are now being organised by the Department, and conferences of entomologists are taking place in Louisiana.

* "Times Trade and Engineering Supplement," 7th April, 1923.

Dusting machinery for the application of the poison has been placed on the market. The question of maintaining an adequate supply of calcium arsenate in the country has naturally been receiving close attention. The specifications recommended by the authorities at Washington are as follow:—

Arsenic pentoxide content not less than 40 per cent.

Water-soluble arsenic pentoxide not to exceed 0.75 per cent.

Density not less than 80 or more than 100 cubic inches per lb.

On the basis of the 1922 cotton acreage, if the planters used the minimum quantity recommended, about 500,000 tons of calcium arsenate (containing 200,000 tons of white arsenic) would be required. The prospects are that only a small fraction of that quantity of white arsenic will be available, and there appears to be little likelihood that any large new production of calcium arsenate in the United States will take place. Moreover, arsenic is already in keen request in many markets for use in fungicides and insecticides. Whilst white arsenic is not subject to import duty in the United States, calcium arsenate is dutiable at 25 per cent. *ad valorem*. A Bill is before Congress for the purpose of freeing it from duty.

The Indian Central Cotton Committee has recommended strict measures against the introduction of the boll weevil in shipments of American cotton. The committee points out that once introduced the boll weevil will be as deadly in India as it has been in America. It has been ascertained that fumigation with hydro-cyanic gas will kill the weevil, and that a simple and safe fumigation plant can be erected at no great cost. On the other hand, correspondence with commercial bodies, including the Mill Owners' Association and Chambers of Commerce, has shown that, for the present at any rate, it is quite feasible to restrict the importations of American cotton to a single Indian port (Bombay), thus greatly simplifying the fumigation arrangements.

THE WORLD'S COTTON PRODUCTION.*

The following table shows the world's production and consumption of cotton from 1908-09 to 1922-23 (estimated) and European consumption for the same years. It will be seen that even with the increase in the last two years European consumption is only 70 per cent. of the pre-war average, while world consumption is almost back to normal.

WORLD COTTON PRODUCTION AND CONSUMPTION FOR THE YEARS INDICATED.
(IN BALES OF 478 LB. LINT.)

Years.	World Production.	World Consumption.	European Consumption.
	Bales.	Bales.	Bales.
1908-09	20,604,000	20,289,000	10,968,000
1909-10	16,988,000	19,164,000	10,295,000
1910-11	18,856,000	19,888,000	11,040,000
1911-12	22,247,000	21,534,000	11,998,000
1912-13	21,550,000	22,533,000	12,117,000
1913-14	22,612,000	22,199,000	12,029,000
1914-15	24,861,000	20,670,000	10,606,000
1915-16	18,461,000	21,978,000	10,878,000
1916-17	18,924,000	21,108,000	9,044,000
1917-18	18,141,000	18,515,000	6,621,000
1918-19	18,765,000	16,705,000	5,962,000
1919-20	20,219,000	19,300,000	7,699,000
1920-21	19,675,000	16,914,000	6,736,000
1921-22	14,741,000	20,047,000	7,771,000
1922-23	17,664,000	20,579,000	7,623,000
Average 1908-09 to 1914-15	21,102,000	.. ..	.. ..
Average 1908-09 to 1916-17 .. ..	.. ..	21,040,000	10,996,000
Average 1915-16 to 1920-21	19,031,000	.. ..	.. ..
Average 1917-18 to 1920-21 .. ..	.. ..	17,860,000	6,755,000
Average 1921-22 to 1922-23	16,202,000	20,313,000	7,697,000

*Bureau of Foreign and Domestic Commerce, U.S.A., per "Textile World," 17th February, 1923.

METHOD OF ESTIMATING.

The consumption estimates covering 1922-23 are based upon reports submitted by Government representatives abroad, which gave the consumption in each country reported upon for the first four months of the season, 1st August to 1st December, 1922. From these consumption figures for the first four months estimates have been made for the entire year. Due consideration has been given to general economic conditions, as well as to special conditions affecting the textile industry in each country; and if some unforeseen change does not occur, it is believed that the totals given are approximately correct. Allowance has already been made for decreases in consumption in many of the countries during the remaining months of the season; but if the price of cotton should go so high as to cause a general curtailment of mill consumption, the quantities consumed for the remainder of the cotton year might fall off so sharply that the above totals would not be reached.

THE WORLD'S COTTON CONSUMPTION.*

ESTIMATED CONSUMPTION—THE 1922-23 ESTIMATE.

The world's consumption of cotton during the years ended 31st July, 1921, 1922, and estimated consumption for the year ending 31st July, 1923, are shown by principal consuming countries in the following table:—

WORLD'S CONSUMPTION OF COTTON—1920-21, 1921-22, AND ESTIMATED CONSUMPTION IN 1922-23.

Countries.	1920-21.	1921-22.	1922-23.
	Bales.	Bales.	Bales.
United States	4,906,000	5,904,000	6,400,000
Europe—			
United Kingdom	2,134,000	2,948,000	3,100,000
Continent	4,602,000	4,823,000	4,523,000
India	1,925,000	1,947,000	1,950,000
Japan	1,883,000	2,275,000	2,500,000
All other	1,464,000	2,150,000	2,106,000
Total	16,914,000	20,047,000	20,579,000

WORLD'S COTTON PRODUCTION FOR 1921-22 AND 1922-23, AND CONSUMPTION FOR 1922-23;
(IN BALES OF 478 LB. NET WEIGHT.)

Countries.	Production 1921-22.	Production 1922-23.	CONSUMPTION 1922-23.	
			American.	All kinds.
	Bales.	Bales.	Bales.	Bales.
United States	7,954,000	7,964,000	6,150,000	6,400,000
Europe—				
United Kingdom .. .. .	..	..	2,100,000	3,100,000
Continent .. .. .	..	..	3,167,000	4,523,000
British India	3,360,000	3,750,000	20,000	1,950,000
Egypt	837,000	1,050,000	..	†
Japan	†	†	600,000	2,500,000
China	1,175,000	1,500,000	†	†
Brazil	612,000	545,000	..	†
All other Countries	803,000	855,000	275,000	2,106,000
Total	14,741,000	17,664,000	12,312,000	20,579,000

*Bureau of Foreign and Domestic Commerce, U.S.A., per "Textile World," 17th February, 1923.

†Included in all other countries.

‡Subject to revision when final ginning returns are received.

FRUIT FLY INVESTIGATIONS.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the following report of the Entomologist at Stanthorpe, Mr. Hubert Jarvis, for the months of April and May, 1923, in relation to the fruit fly and other injurious insects.

FRUIT FLY.

Field Observations.

During the whole of the month of April the adult fruit fly (*C. tryoni*) was seen but rarely in the orchards; its absence being accounted for by the continuous cold, south-easterly wind and misty rain, which set in on 2nd April, and obtained throughout this period. The larvæ, however, are still (24th May) to be met with in late apples and quinces, both on the trees and in the packing sheds. The last appearance of fruit fly in the orchard observed by me (resting on ripe quinces) was on 2nd May.

Field Experiments.

(1) With a view to ascertaining how far (*i.e.*, through what depth of soil) the adult fruit fly will travel on emergence from the pupa, several experiments have been carried out in the field, and also in the Insectary. In the latter instance, fifty pupæ were used in each experiment. These were placed on 1 inch of sifted soil, in separate glass containers, and these were then filled with similar sifted soil, to varying depths (*i.e.*, from 3 to 15 inches). No fruit flies have emerged to date from any greater depth than 6 inches. Similar experiments have been arranged in the field. In this situation holes were dug in the soil to the required depth, and the pupæ placed in these, instead of the glass containers, and the area embraced in each experiment covered in with mosquito gauze.

(2) Experiments, bearing on the question of the wintering of the fruit fly in the orchards, have been undertaken, as follows:—

Traps have been placed in various localities, these traps containing both pupæ and maggot-infested fruit. In the case of the latter, this was placed on the surface of the soil, and covered in with gauze, the soil being previously loosened and cleared of weeds. The conditions thus afforded are, more or less, quite natural conditions, and should give the maggots contained in the fruit every opportunity to escape into the soil and pupate. The pupæ were placed in previously loosened soil, at similar depths to those in the Insectary, 100 pupæ being used instead of 50 in each experiment, and the traps covered as above. A quantity of maggot-infested fruit (quince) has been buried in the soil at depths from 6 to 18 inches. These traps will, it is proposed, be left until the spring, and periodically examined. These experiments should prove conclusively the possibility of the fruit fly over-wintering, or its inability to do so in this district.

Seasonal Occurrence (May).

(1) *The Pupa.*—Many pupæ (fly chrysalises) have been found within the fruit (quinces and late apples, var. Rokewood). Both the quince and this variety of apple are of very hard consistency, and the fruit fly maggots have, therefore, difficulty in breaking down the tissue, in feeding, and so mature very slowly. Indeed, in many cases they find it impossible to escape from the fruit, and are so forced to pupate in some cavity within it. From these pupæ, the adult fruit flies often emerge where they occur, and, being unable to escape, die. I have, on cutting open Rokewood apples and quinces, recently found both living and dead fruit flies within, as well as pupæ. It is, of course, possible that a percentage of pupæ of those occurring in sheltered situations, such as in or under packing sheds, get through the winter and give rise to flies in the spring. This point we should be definitely able to decide when this present winter has elapsed. Meanwhile, every precaution should be taken by orchardists to insure—acting on the assumption that such will take place—that no opportunity be given to the fruit fly to over-winter in their packing sheds. In my last report I mentioned this possible danger, and must, again, very strongly emphasise the vital importance of a thorough “clean-up” of all sheds.

(2) *The Maggots*.—Although very late in the season, fruit fly maggots are still present in quinces and late apples in the Insectary; and also so in stored apples, throughout the district.

(NOTE.—We have this season already, here in Stanthorpe, experienced several sharp frosts; the lowest temperature recorded by me, so far, in the Insectary, was 25 degrees Fahr.)

(3) *The Fly—Hatchings*.—Twenty-four fruit flies (*C. tryoni*) hatched in the Insectary during the month of April, but only eighteen have emerged to date, in the month of May.

Co-operation (New South Wales).

Arrangements have been made by the Queensland Department of Agriculture whereby the New South Wales Officer, Mr. Inspector Lindsay, will co-operate with us in fruit fly investigations. Experiments similar to those we have in hand could be carried out also in New South Wales by that officer; this procedure would help in locating definitely the area in which the Queensland fruit fly over-winters in its pupa form—i.e., presuming that this is its habit. We would also welcome a visit from the New South Wales Government Entomologist-in-Chief or his Assistant, when such experiments as we are carrying out could be shown him, and the matter of how persistence of "The Fly" is effected discussed.

Over-Wintering of Fruit Fly.

The question of the fruit fly wintering (or over-wintering) in the districts adjoining the Granite Belt, both those in New South Wales and Queensland, is an important one. The creation of a buffer area of 25 miles radius surrounding the Granite Belt, and all commercial fruit trees and native fruits (if any) within this area destroyed, has been suggested by a local resident, thus isolating the Granite Belt. Should we be able to prove that the fruit fly winters in fruit within this 25 mile area, and travels later thence into the Stanthorpe district, the establishing of such an area surrounding the district would be a very excellent scheme indeed, provided certain difficulties associated with its prosecution could be surmounted. If, on the other hand, we can prove that the fly does not travel by its own flight into the Stanthorpe district, and that our main danger is in imported fruit, and in our own lack of care in cleaning up our orchards and packing sheds, the need for this proposed *Luffer* area will be a very debatable proposition. It is, of course, possible for the fruit fly to travel short distances, and it could, when once present in the district, easily travel from one orchard to another, and most likely does so, as many orchards are separated from those adjoining only by a fence or a narrow strip of grass or bushland.

As bearing on these questions, it is intended, during the winter months, to make excursions into the districts in New South Wales and Queensland, surrounding the Granite Belt, and then careful search will be made for the fruit fly in any of its stages in these districts within, say, a radius of 40 miles.

OTHER INJURIOUS INSECTS.

Codling Moth.

The destructive caterpillar of this well-known moth has this season been unusually abundant, in spite of the care exercised by most orchardists in consecutive sprayings with arsenate of lead. The Codling Moth has, moreover, during the period, not only bestowed its attention on apples and pears, but also has been quite abundant in late peaches, plums, and quinces. I have, so far, not been successful in discovering here, in breeding experiments, any parasite of this moth. Throughout the district the larvae are now to be found in packing sheds, between cases, within old papers, or in any such suitable harbourage. Fruit fly maggots and pupae are also present in many sheds, in fruit and under piles of cases, and in all sorts of crevices and corners, and a systematic clean-up should be taken in hand before the spring by all orchardists. Owing to the loose and open structure of most packing sheds, adequate fumigation by cyanide gas is a very difficult matter indeed, but, where this is possible, it is undoubtedly the best means of destroying these pests. Failing this, a careful search

for larvæ and pupæ in every likely situation should be carried out, and when found they should be destroyed. Boiling water poured into cracks and crevices between boards should prove useful in the work of destruction. All cases and piles of case-timber should be shifted, and each case thoroughly scoured and cleaned. All fruit remaining in the sheds should be placed in some more or less airtight container, and fumigated either with bisulphide of carbon or with cyanide gas. Further, all dust and rubbish should be brushed up and burnt.

Woolly Aphis.

Much interest is being taken in the experiments now being conducted in New Zealand, with the *Aphelinus* parasite of the Woolly Aphis, introduced into that country by Dr. R. J. Tillyard, M.A., in 1913. Application has been made to Dr. Tillyard for a consignment of this useful insect for the Stanthorpe district. It should prove (should we be successful in establishing it) of considerable importance in helping to control, as it has been done in New Zealand, so in this Granite Belt area also, the pest in question.

Tomato Caterpillar.

On 4th May, a new and injurious caterpillar of the tomato was brought to my notice. This caterpillar, the larva of one of our small moths (Fam. Pyralidæ) is, when full grown, not more than half an inch long; the head and first segment of the body are a shining brown-black, and the remaining segment of a greenish white colour. The chrysalis is about $\frac{3}{4}$ inch in length, and golden brown in colour, and is enclosed in a web cocoon, formed by the caterpillar and covered with particles of soil and grass. To date no moths have emerged as is necessary for the identification of the insect. This caterpillar generally attacks the flower end of the tomato fruit, mining to and fro in its tissue, and avoiding carefully the liquid pulp which encases the seeds. I have found as many as three of these caterpillars in one tomato, and when even one or two are present the fruit is soon rendered unfit for market. This pest appears only to attack the late tomatoes, and, so far, I have only one record of its presence. Several tomato-growers have, however, told me that it has been noticed by them during the last few weeks. The discovery of this insect in association with the tomato may be regarded for the time being as only a casual local incident pertaining to the habits of a local insect, and to have, therefore, no economic significance.

FUNGUS DISEASES.

Tomato.

One or two tomato troubles, commonly found in the Granite Belt area, were submitted to Mr. Tryon, Government Entomologist and Vegetable Pathologist, for his report, and these troubles are common to most growers. I insert Mr. Tryon's report, which should be of interest to many.

"The tomato (5) fruits forwarded by Mr. H. Jarvis on behalf of Mr. E. Sewell, Applethorpe, exhibit two different kinds of disease.

"Dark-brown sunken areas, sometimes coalescing, immediately surrounding the fruit-stalk insertion. These are probably caused by a fungus that is found associated with them, and that occurs externally as a white flocculent substance. This fungus is evidently a species of *Dactylium*, and probably corresponds to a form of *D. lycopersici*, Plowright, described in the eighties of the last century as causing an affection of tomatoes still growing, being met with them in the United Kingdom. Its habit of occurring upon the under surface of the fruit is a noteworthy characteristic.

"Blossom-end Rot (Bacterial).—One of the five fruits exhibits a large brown bruise-like patch at the flower end, and the dead tissue to whose presence this patch is due is accompanied by the growth of several distinct fungi. These are probably, none of them, parasites, but have followed bacterial decay. However, at a stage of disease such as is manifested by the fruit sent, it is difficult to assign the primary agent to which the inception of the trouble is due.

"It is not easy to suggest a method of control for these diseases, other than consists in spraying the plants with some fungicides, such as Bordeaux Mixture rendered quite neutral prior to application. However, the former of the two mentioned, according to report, attacks one kind of tomato in preference to all others, and, should this be the Stanthorpe experience, profit may be taken from this fact. However, two of the specimens exhibit previous damage by some puncturing insect—e.g., Green Bug (*Nesara*)—and the wound present may be a contributing factor in determining disease-presence.

"Advantage may be taken of this fact. Finally, when gathering the fruit already ripening, disease-affected tomatoes should be similarly collected and afterwards destroyed, lest otherwise if suffered to remain they prove centres of further infection."

THE FUTURE OF THE SUGAR INDUSTRY.

ANNOUNCEMENT OF FEDERAL POLICY.

On Tuesday, 5th June, the Prime Minister of the Commonwealth (Hon. S. M. Bruce, M.C.), announced the Federal Sugar Policy at Brisbane. The Policy provides for a definite termination of the Sugar Agreement and a continuance of the existing embargo on black-grown sugar for a further period of two years, subject to conditions set out hereunder. Subjoined is a *precis* of the Prime Minister's remarks.

THE PRIME MINISTER'S ADDRESS.

Discussing Federal policy generally at a public meeting in Brisbane on Tuesday, 5th June, the Prime Minister (Hon. S. M. Bruce, M.C.) referred, *inter alia*, to the sugar industry and Federal policy in connection therewith. From the Prime Minister's announcement the following points are taken:—

It is impossible to deny or overlook the legitimate claim of an industry that pays £6,000,000 a year in wages to some 25,000 employees, and produces a crop worth up to £9,000,000 per annum. It ranks among the very largest primary producing interests of Australia in any or all of the States.

Economically, the sugar industry is of even greater importance to the nation than a superficial examination of trade statistics would indicate. For it should always be remembered that, if sugar were not produced in Australia, from £5,000,000 to £6,000,000 would have to be remitted each year to foreign countries, which buy, in return, scarcely any of our goods. During the Government control period just expiring, over £47,000,000 was thus kept and spent in Australia in respect of the locally grown tonnage.

The national or political significance of the industry is even more arresting to the mind. In this regard the sugar industry stands in a unique position in Australia—for it is the sole industry of any magnitude at all that has been successfully carried on in those far North Coastal lands that are of such strategic importance to the White Australia policy.

Looking at the map, observers will notice that the Northern Territory is practically in the same latitude as Cairns, Innisfail, Mossman, Herbert River, and other very large, closely settled sugar districts. Yet the Territory's white population is lower than it was thirty years ago, and the problem of developing it seems as difficult of solution as ever. On the other hand, the sugar districts mentioned have witnessed constant substantial increases in farms, settlement, commerce, and population. The Government is pleased to note that the record percentage increase in population during the last census period occurred in the Herbert River district—a purely sugar locality—and that large towns like Townsville, Cairns, and Mackay, and other smaller places are wholly or principally dependent upon sugar for their existence.

It is imperative that the far North should be developed and settled with the white race, so that prosperous, happy, healthy, thoroughly acclimatised citizens of British stock should be resident there in tens of thousands to justify to the world our moral right to this magnificent country, and to act as the first line of defence and the bulwark of our most cherished policy of White Australia.

The 1912 and 1920 Royal Commissions on sugar both freely recognised the obvious fact that the continuance of the sugar industry is bound up with the very existence of Australia as a nation.

There will not be another sugar agreement. The Government's proposals are designed simply to meet existing conditions in a manner which, it is hoped, will appeal to the instincts of business and fair play common to sugar interests, Southern manufacturers, and other sugar consumers. In formulating its plans, the Commonwealth Government has been faced with two important circumstances, which unavoidably dominated the situation.

First, that there will be in Australia at the end of the agreement on 30th June, 57,500 tons of Government sugar.

Second, that sugar, alone of our primary producing industries, has no outside market whereby this surplus could be sold without loss (by virtue of the fact that all competing sugar is produced by black labour, which is paid wages far below the standard prevailing in Australia).

The Government surplus cannot be sold until 30th September, 1923, and will meanwhile displace a similar quantity of the uncontrolled new season's sugar which the Queensland pool, if established, will require to finance. The future position as to stocks is thus:—

30th June, 1923, Government's surplus against 1923-24 crop, 57,500 tons.

1923-24 consumption	..	..	..	..	280,000
Less 1923-24 crop	..	..	..	..	260,000
					<hr/>
Shortage in crop	..	..	..	..	20,000

30th June, 1924.—Surplus against 1924-25 crop, 37,500 tons.

Against the surpluses of 57,000 and 37,500 tons respectively might be set the 17,500 tons normal carry-over stocks usually held in refineries.

If the recent beneficial rains improved the 1923-24 crop (already estimated at 260,000 tons), the surplus at June, 1924, would be correspondingly greater. The surplus of 37,500 tons would be a serious menace to the 1924-25 crop, if the latter equalled consumption, which was possible with the present acreage and good weather conditions, and the surplus would be increased if foreign imports were to be allowed to come in. Moreover, it was recognised that there would be a very considerable loss in storage costs and in the strength of the 57,500 tons surplus that would have to be carried during the next twelve months, and of the 37,500 tons or more that would be carried for portion of the 1924-25 season.

This dilemma can be escaped by the Commonwealth Government selling its surplus abroad, but that course would involve a loss of probably £6 or £7 per ton on 40,000 tons (the excess carry-over), equivalent to from £240,000 to £280,000.

After carefully viewing the situation from all angles, the Commonwealth Government is forced to the conclusion that it is responsible in some measure for the existing surplus sugar—as the surplus is a direct result of the greatly increased acreage and production brought about by the agreement fixing the price of raw sugar at £30 6s. 8d. per ton.

Under the circumstances, the Commonwealth Government will continue the existing embargo on black-grown sugar for a further period of two years, subject to the following conditions:—

- (1) The industry to form a pool free from the control of the Commonwealth Government, and to buy raw sugar for the 1923-24 season at not more than £27 per ton of 94 net titre, f.o.b. mill.
- (2) The pool to enter into negotiations with the Colonial Sugar Refining Company, Limited, and the Millaquin Sugar Company, Limited, for an agreement to refine and distribute the sugar on the lines of the existing refining agreements—the price for such services to be subject to the approval of the Commonwealth Government.
- (3) The pool to provide sugar for the purpose of manufactured goods for export at a price equal to the current world's parity.
- (4) A competent authority, upon which the Commonwealth Government shall be represented, to be appointed to determine the price at which sugar is to be supplied for the export trade.
- (5) The price for raw sugar for the 1924-25 season to be determined after investigation by a tribunal, and to be based upon the cost of efficient production in reasonably good districts and under normal conditions; such price not to exceed £27 per ton.
- (6) The tribunal (see clause 5) to have regard, in ascertaining the cost of production, to excessive wages (if any) paid in the sugar industry as compared with other primary industries, owing, say, to the pool's fixed price for raw sugar.
- (7) The pool to give the public the full advantage of any reduction, including costs of refining and distribution, effected from time to time.
- (8) Subject to the foregoing conditions, the Commonwealth agrees to continue the present prohibition of the importation of black-grown sugar, until 30th June, 1925, except
 - (a) As to the foreign sugar necessary—as determined by the competent authority—to meet any shortage in Australia; and
 - (b) As to any kind of sugar not available in Australia that may be required for special manufacturing processes.

It is to be distinctly understood that, under no circumstances, will the embargo be continued after 30th June, 1925. The present proposals of the Commonwealth will give the sugar industry time in which to organise, so as to be able to meet any violent fluctuations in the world's price of sugar which may occur after the embargo is lifted.

After June, 1925, the sugar industry will be protected against unfair competition by means of a Customs duty in the same way as every other industry is protected. This duty will be of an amount which will enable the industry to carry on at a reasonable profit when the price of black-grown sugar is normal. The industry must, however, during the period that is now granted to it, so organise itself as to be able to meet without assistance the difficulties which will arise in any period when the world's price for sugar reaches an abnormally low figure.

The Commonwealth's proposals will procure the following beneficial results:—

To consumers: Retail price will be reduced by at least $\frac{1}{4}$ d. per lb. early in October.

To manufacturers: (1) Sugar for home trade will at the same time be reduced by at least £5 per ton. (2) Sugar for export trade will be supplied from Australian stocks at actual world's parity in such a manner that manufacturers will not be at a disadvantage by not having freedom to import. (3) Foreign sugar necessary for special manufacturing processes will be allowed entry.

To sugar industry: (1) The huge surplus stocks will not now be a serious and unfair menace to the next two crops. (2) Stability and security will be guaranteed for the next two years. (3) Those two years will act as a breathing space, enabling the industry to organise carefully against any emergency that may arise thereafter. (4) The industry now definitely knows exactly where it stands in relation to the Commonwealth Government, the embargo, the tariff, and the future generally.

CANEGROWERS' PROTEST AND ACTION BY THE STATE PREMIER.

The Hon. W. N. Gillies, interviewed with regard to the sugar position, stated that, in view of telegrams received from the North protesting against the Prime Minister's offer regarding sugar, the Premier (Hon. E. G. Theodore) had invited three members of the Australian Sugar Producers' Association and three members of the United Cane Growers' Association to meet him.

Arrangements had consequently been made for three members from each of these organisations to meet the Premier on Friday, 15th June.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS FOR MAY, 1923.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Prim	Friesian ...	4 April, 1923	1,350	3.4	53.40	
College Cold Iron	Jersey ...	23 April, "	630	5.8	43.20	
Charming Damsel	Ayrshire ...	27 April, "	714	4.1	34.34	
Lady Loch II. ...	" ...	26 April, "	700	3.9	31.85	
College Prima Donna	Friesian ...	19 Mar., "	690	3.6	28.80	
Lute	Ayrshire ...	26 April, "	525	4.7	28.70	
Lady Mitchell ...	Friesian ...	1 May, "	620	3.8	27.69	
College Evening Glow	Jersey ...	5 April, "	540	4.2	26.70	
Rainfall of Marinya	Ayrshire ...	29 Mar., "	630	3.8	25.80	
Yarraview Village Belle	Guernsey ...	19 Feb., "	420	5.2	25.80	
College Nita ...	Friesian ...	5 April, "	600	3.6	25.20	
Bellona	Ayrshire ...	30 Aug., 1922	420	4.7	23.10	
Little Buttercup ...	Friesian ...	3 Mar., 1923	570	3.4	22.50	
Lady Peggy ...	Ayrshire ...	18 Dec., 1922	480	4.0	22.20	
Pretty Maid of Haremar	" ...	11 Sept., "	420	4.3	21.00	
Royal Mistress ...	" ...	25 Nov., "	480	3.7	20.70	
Auntie's Lass ...	" ...	18 April, 1923	390	4.4	20.10	
College Mignon ...	Jersey ...	22 Nov., 1922	390	4.4	20.10	
College Sunrise ...	" ...	8 Sept., "	320	5.3	20.00	

QUEENSLAND'S DAIRYING INDUSTRY.

ANNUAL CONFERENCE AND EXHIBITION.

In 1905 Queensland's Butter Production amounted to 20,320,000 lb. In 1913 it had risen to 35,230,000 lb. In 1921 it reached the high level of 60,200,000 lb., and yet the industry is only in its initial stages.

The Australian Market affords the best demand for Australian Dairy Products.

95 per cent. of the State's Butter Output is produced co-operatively.

The fact that at the great Islington Show Queensland Butter secured the highest honours is most satisfactory to all concerned.

HON. W. N. GILLIES,
Minister for Agriculture and Stock.

The Annual Conference of Dairy and Cheese Factory Managers was held in Brisbane on 30th May.

Attendance.

Messrs. F. W. Uhlmann, Caboolture (president); J. J. Searl, Warwick (secretary); M. J. Wilkins, Toowoomba; D. Saxelby, Booval; W. S. Hartley and G. E. S. Raynor, South Burnett; R. Graham, Pittsworth; H. McDougall, Kin Kin; G. Newton, Nanango; J. Hunter, Gympie; E. Haworth, Eumundi; W. Schmidt, Caboolture; P. E. Peters, Talgai; A. L. Thomas, Greenmount; J. D. Denham, Greymare; H. T. Burton, Bonnie Mountain; B. C. Cumming, Cooroy; T. Green, Greenmount; W. A. Smith, Esk; E. Donald, Grantham; M. Morgensen, Kingaroy; F. Rutkin, Esk; L. W. Hind, Roma; F. W. Denny, Oakey; J. P. Duers, South Queensland Dairy Company; W. J. Egan, Gayndah; D. J. McCarthy, Warwick; E. M. Moloney, Clifton; A. C. Leikiss, Allora; D. Gamble, Biddeston; S. Duxbury, Pratten; J. W. Purcell, Greenmount; Jas. Reid, Lachlan; — Hunt, Laidley.

The Minister for Agriculture and Stock (Hon. W. N. Gillies), the Director of Dairying (Mr. E. Graham) and other departmental officers, were also present. Following is a *precis* of the proceedings:—

Presidential Address.

The president (Mr. F. W. Uhlmann), in his address, declared that last year was the most successful in the history of the association. He was satisfied that if the members of the association continued to take the same keen interest in the affairs of the association that they now were doing, they would achieve great things for the industry. (Applause.)

The financial statement showed a credit of £463, against £419 last year.

Election of Officers.

Mr. D. Saxelby (manager of the Queensland Farmers' Factory at Booval) was elected president; Messrs. R. A. Wilkin and W. S. Hartley vice-presidents; Mr. J. J. Searl secretary; and Messrs. Uhlmann, Denning, Dewars, Graham, Wiltshire, Thomas, and Rutledge an executive committee.

Complimentary references were made to the way in which Mr. Uhlmann, who has held the office of president for several years, and the secretary had done their duties. In accordance with the practice of the conference, the retiring president remained in the chair.



PLATE 110.—MEMBERS OF THE BUTTER AND CHEESE FACTORY MANAGERS' CONFERENCE, BRISBANE, 1923.

Left to Right—Back Row: MESSRS. O'SHEA, W. A. SMITH, P. E. PETERS, A. C. LEIKISS, E. DONALD, FERRINGTON, D. GAMBLE, G. NEWTON, McCORM, D. J. MCCARTHY, L. W. HIND, McGRATH.

Centre Row: MESSRS. E. M. MOLONEY, M. WALLACE, F. E. GRAHAM, F. W. CHIDMANS, D. SANDEBY, J. J. SEARL, R. GRAHAM, M. J. WILKINS, W. S. HARTLEY.

Front Row: MESSRS. F. RUTIN, G. E. S. RAYNOR, S. DUNBURY, J. RED, J. D. DENHAM, H. T. BERTON.

Refrigerated Cream Waggon.

A suggestion regarding the refrigerating of cream waggons on the railway was regarded as impracticable by a number of speakers.

Mr. Wilkins, however, favoured a trial of the proposed system, and the erection of cooling depôts at the stations, in so far as Darling Downs branch lines were concerned.

Mr. Saxelby moved that the Railway Department be asked to make a trial of insulated wagons for the carriage of cream over long distances.

The motion was agreed to without dissent.

Uniform Payments.

Mr. Newton (Nanango) introduced the subject of uniform payments and distribution of export surplus.

Mr. Saxelby said the Co-operative Dairy Factories' Association referred the matter to the Pool Committee.

Mr. Wilkins declared that the matter was a very serious one. The quicker a common-sense method of payment was evolved the better for everybody. He moved that the Co-operative Dairy Factories' Association again be asked to deal with the matter.

Mr. Hartley moved an amendment, expressing appreciation of the Downs Factories' Association's action in referring the matter to the Pool Committee, and asking the association to endeavour to secure a more satisfactory system of payment for cream.

The motion was carried.

THE MINISTER'S SPEECH.

The Hon. W. N. Gillies (Minister for Agriculture) was cordially welcomed by the retiring president at this stage. He asked the Minister to open the fourth annual conference and show of the association.

Mr. Gillies spoke of the benefits of such conferences and shows. He was greatly gratified to know that 95 per cent. of Queensland butter was produced under the co-operative system. In that connection he desired to state that the Government intended to pass legislation to prevent the use of the word "co-operative" by companies which were of a proprietary character. The fact that Queensland butter scored the highest honours at the Islington show was a source of greatest satisfaction and encouragement to them all. The butter industry was only in its infancy in Queensland, for there was more room for expansion in it here than in all of the other States combined. In 1905 the quantity of butter produced in Queensland was 20,320,000 lb. In 1913 it had risen to 35,200,000 lb., and in 1921 it reached the high level of 60,200,000 lb. And yet it was only in its initial stages. There were three ways of dealing with one's fellows. The first way was to ignore them, the second to compete with them, and the third to co-operate with them. Co-operation and efficiency should be the twin watchword of the dairying industry. He was sure the farmers did not want charity, but they deserved a little assistance, and the Council of Agriculture would render that help that they so much needed. Herd testing could not be too earnestly or too frequently advocated, seeing the average production per cow in Queensland was only 150 lb. of butter per annum. Water and fodder conservation were national matters, for a drought affected everybody. Recent events had shown them how impossible it was to regulate overseas prices, and that the Australian market, where working men were higher paid than overseas, afforded the best demand for Australian dairy products. But they must endeavour to induce the Victorian and New South Wales producers to come more into line with the producers of Queensland. (Applause.)

The Minister read the result of the competitions at the show held in conjunction with the conference.

SECOND DAY'S SESSION.

Papers on subjects of interest to those engaged in the dairying industry claimed the attention of delegates to the fourth annual conference of the Queensland Butter and Cheese Factory Managers' Association on 31st May. Mr. F. W. Uhlmann (retiring president) occupied the chair.

Mr. Hartley (manager of the South Burnett Co-operative Dairy Company) dealt with defects in cream, the probable causes of which were indicated and remedies for which were suggested.

Mr. M. Wallace (Commonwealth Dairy Branch) gave a long and interesting general résumé of the season's export operations. The paper showed a considerable falling off in last season's gradings, both of butter and cheese. Quality, however, had been more uniform.

In the course of the discussion which ensued reference was made to a cold storage scale upon which the Commonwealth officials were depending, and which was found to be faulty.

Mr. Wallace explained that the scale in question was examined several times by the inspector of weights and measures, and although the scale was satisfactory at the beginning of the day, it became erratic later. He never held up a box of butter because of a 2-oz. shortage.

The president suggested that the holding up of allegedly shortweight butter should be referred to the executive, and this was agreed to.

Mr. R. Winks (Department of Agriculture) detailed some of the results of butter-grading experiences. He stated that even the packing-paper was responsible for deterioration in quality.

Mr. J. G. McMillan (Commonwealth Dairy Branch) tackled problems revolving around cheesemaking.

Papers of a more or less technical character and discussions thereon absorbed the whole of the afternoon sitting.

Mr. G. H. E. Heers (Department of Agriculture) read an informative paper on the 1923 monthly butter competition. Mr. Heers complimented the exhibitors generally upon the texture of the butters which competed at the association's annual show, but declared that there still was a good deal of room for improvement as to finish. He also demonstrated with the aid of a butter-box his idea of perfect branding, and showed the difference between the popular and the proper method of wrapping butter-pats. Photographs showing good and faulty packing methods were produced.

Mr. Heers also submitted a table showing the results in the continuous butter competition, won at the present year's show by the Allora factory, Laidley being second, and Booval third. These details showed that Laidley led in flavour, Booval being second, and Allora third. Esk, Booval, Laidley, and Allora all tied for texture with 10 points. All of the factories but two scored the maximum for salting, all of them secured 25 points for colour, ten of them tied for finish, and Eumundi was top in packing, with Toowoomba half a point behind.

"Some Faults in Cheese Production from the Dairy to the Market" was the theme upon which Mr. R. M. K. Snell (State Instructor in Cheesemaking) discoursed.

Other papers were "Manufacture of Butter" (Mr. A. Sheehan), "The Cream Supply and the Grading of Cream at the Butter Factories" (Mr. F. J. Watson), "General Notes on the Manufacture and Export of Cheese" (Mr. R. A. Wilkin), and "Cream Grading" (Mr. C. McGrath).

The full text of the technical papers read at the Conference will be reproduced in the Journal.

THE COMPETITIONS.

RESULTS OF THE JUDGING.

One afternoon was set aside by the members of the conference to inspecting the exhibits in the various sections of cheese and butter competitions. These exhibits were on view in the show rooms of the Queensland Farmers' Co-operative Society in Turbot street. Mr. E. Graham, Director of Dairying, Department of Agriculture, who was one of the judges, attended the show and explained to the members the reasons which induced the decisions of the judging, and also furnished much information of an educative character. Keen interest was taken in his remarks and demonstrations.

The results of the competitions were as follows:—

NOVEMBER TO MARCH TEST.

Box of butter to be taken from ordinary consignments of first grade brand during the months of November to March. First prize, £15 15s.; second, £5 5s. Scale of points for judging: Flavour, 60; salting, 5; colour, 5; finish, 5; packing, 5. Judge, Mr. Hears (Department of Agriculture).

Warwick Butter Co., Allora, 462 points	..	..	..	..	1
Queensland Farmers' Co-operative Dairy Co., Laidley, 461½ points	..	..	..	..	2
Queensland Farmers' Co-operative Dairy Co., Booval, 461 points	..	..	..	..	3

Detailed results—

	Nov.	Dec.	Jan.	Feb.	Mar.	Totals.
Cooroy	90½	91	91½	92½	93	458½
Gympie	91½	87¾	90½	90	92	451½
Esk	92½	92½	92½	90½	92	459½
Oakey	89¾	89¾	90½	88½	91½	449¾
Logan and Albert	92½	90¾	92½	90¾	91¾	457¾
Kin Kin	89½	90½	86½	92	90	447½
Stanley River	90¾	88¾	91	92	92	454
Caboolture	91½	89	88	92	93	453½
Pomona	90	90	91	89½	90½	450½
Eumundi	90¾	91	89	91	91	452½
Gayndah	91	90	89	91½	92	453½
Terror's Creek	91	90½	90	90	90½	451½
Bundaberg	87	86¾	85¾	84½	86	430
Maleny	92¾	91½	89½	91½	91½	456¾
Goombungee	91	91½	87¾	89¾	89¾	449¾
Nanango	90	90¾	89½	92½	90	453
Chinchilla	86¾	89¾	90	89½	87½	443½
Toowoomba	90½	91½	91½	92½	92½	457½
Dalby	91	89¾	87½	91½	90¾	450
Crow's Nest	91¾	90¾	91½	91½	91½	457
Kingston	91½	91½	92½	92½	92½	459¾
South Burnett	92½	91	91½	91½	92½	459
Warwick	91	89½	91½	92	90¾	454½
Allora	93	91½	93½	92	91¾	462
Killarney	89½	89½	88½	89½	89¾	446
Booval	93	91½	92	92	92¾	461
Boonah	92	91	92¾	92½	91	459½
Grantham	90½	91½	92½	90¾	92	457
Laidley	92	93	91¾	93	92	461¾
Kingaroy	92½	91½	92½	91½	91½	459
Biggenden	90½	90½	92	91¾	91¾	456½
Mundubbera	92	88	90¾	92¾	91½	454½
Roma .. .. .	..	90½	89	88	90	..
Clifton	89¾	89	91½	92	..	..
Wowan .. .. .	..	..	87¾	87¾	84¾	..
Gladstone .. .. .	..	..	87½	89	91½	..
Rockhampton .. .. .	..	..	88¾	88¾	..	..

CONTINUOUS CHEESE TEST.

Mr. McMillan (Commonwealth Butter Department) acted as judge. The results were—

Pittsworth (P.), 92.7 points	..	..	..	..	1
Irongate, 90.8 points	..	..	..	..	2
Warwick (B.M.), 90.6 points	..	..	..	..	3

The details were—

Name of Factory.										Average Points for Five Months.
Pittsworth	..	..	..	..	..	..	..	..	..	92.7
Irongate	..	..	..	..	..	..	..	..	..	90.8
Warwick (B.M.)	..	..	..	..	..	..	..	..	..	90.6
Mount Sibley	..	..	..	..	..	..	..	..	..	90.2
Warwick (G.)	..	..	..	..	..	..	..	..	..	90.0
Warwick (E.V.)	..	..	..	..	..	..	..	..	..	89.8
Felton	..	..	..	..	..	..	..	..	..	89.8
Warwick (V.H.)	..	..	..	..	..	..	..	..	..	89.8
Biddeston	..	..	..	..	..	..	..	..	..	89.7
Warwick (T.)	..	..	..	..	..	..	..	..	..	89.6
Mount Tyson	..	..	..	..	..	..	..	..	..	89.4
Unity (G.J.) Downs Co-operative Dairy Company	..	..	..	..	..	..	..	..	..	89.2
Yargullen	..	..	..	..	..	..	..	..	..	89.3
Pittsworth (B.)	..	..	..	..	..	..	..	..	..	89.2
Ramsay	..	..	..	..	..	..	..	..	..	89.0
Southbrook	..	..	..	..	..	..	..	..	..	89.0
Unity (K.) Downs Co-operative Dairy Company, Limited	..	..	..	..	..	..	..	..	..	88.9
Pittsworth (E.)	..	..	..	..	..	..	..	..	..	88.9
Rocky Creek	..	..	..	..	..	..	..	..	..	88.8
Pittsworth (Y.)	..	..	..	..	..	..	..	..	..	88.7
Warwick (P.)	..	..	..	..	..	..	..	..	..	88.6
Warwick (L.J.S.)	..	..	..	..	..	..	..	..	..	88.6
Pittsworth (L.)	..	..	..	..	..	..	..	..	..	88.4
Pittsworth (T.)	..	..	..	..	..	..	..	..	..	88.2
Crosshill	..	..	..	..	..	..	..	..	..	88.2
MacLagan (Moola)	..	..	..	..	..	..	..	..	..	88.2
Etondale	..	..	..	..	..	..	..	..	..	88.1
Kelvinhaugh	..	..	..	..	..	..	..	..	..	88.0
Woodleigh	..	..	..	..	..	..	..	..	..	87.8
Unity (a) Downs Co-operative Dairy Company, Limited	..	..	..	..	..	..	..	..	..	87.6
Unity (H.V.) Downs Co-operative Dairy Company, Limited	..	..	..	..	..	..	..	..	..	87.2
Unity (J.) Downs Co-operative Dairy Company, Limited	..	..	..	..	..	..	..	..	..	87.2
Kooroongarra	..	..	..	..	..	..	..	..	..	86.2
Merrimac	..	..	..	..	..	..	..	..	..	86.3
Rosalie	..	..	..	..	..	..	..	..	..	83.4

BUTTER—THREE WEEKS' STORAGE.

Mr. E. Graham (Department of Agriculture) acted as judge. Salted butter packed for export.

Queensland Co-operative Company (Booval), 93 points..	1
Terror's Creek Company, 92 points	2
Nanango, 91½ points	3

Factory—	Flav.	Tex.	Salt.	Colour.	Finish.	Packing	Total.
	60	20	5	5	5	5	—
Nanango Dairy Company ..	52½	19½	5	5	5	4½	91½
Q.F. Company, Grantham ..	50	19½	5	5	4¾	4¾	89
Caboolture (C.C.C.) ..	51	19½	5	5	5	5	90½
Downs, Clifton ..	52	19½	5	5	4¾	5	91½
Logan and Albert ..	51	19½	5	5	4½	4¾	89¾
Warwick, Allora ..	52	19½	5	5	4¾	5	91½

BUTTER—THREE WEEKS' STORAGE—*continued.*

—	Flav.	Tex.	Salt.	Colour.	Finish.	Packing.	Total.
Factory—	60	20	5	5	5	5	—
Q.F. Company, Booval	53½	19½	5	5	5	5	93
Gayndah Co-operative Dairy Co. ..	49½	19½	5	4¾	4¾	4¾	88½
Warwick, Goondiwindi	49	19½	5	5	4½	5	88
Murgon	52	19½	5	5	4¾	5	91½
Pomona (C.C.C.)	51	19	5	5	4¾	5	89½
Terror's Creek	53	19½	5	5	4½	5	92
Downs (Dalby)	51½	19½	5	5	4¾	4¾	90½
Q.F. Company, Laidley	51½	19½	5	5	5	5	91
Port Curtis	50	19½	5	5	4½	5	89
Warwick (Mill Hill)	50½	19½	5	5	4½	4¾	89½
Eumundi (C.C.C.)	50	19½	5	5	5	5	89½
Q.F. Company, Boonah	51½	19½	5	5	5	5	91
Esk Co-operative Dairy Company ..	52	19½	5	5	5	4¾	91½
Downs (Brook St.)	49½	19½	5	5	4¾	4¾	88½
Wide Bay, Cooroy	50	19	5	4¾	4¾	5	88½
Maryborough (Kingaroy)	52	19½	5	5	4½	5	91

BUTTER—THIRTY DAYS' STORAGE.

Class No. 4. Judge, Mr. E. Graham (Department of Agriculture). Packed for export.

Queensland Farmers' Co-operative Company (Boonah), 93 points) .. 1

Logan and Albert Company, 92½ points 2

Nanango, 92½ points 3

—	Flav.	Tex.	Salt.	Colour.	Finish.	Packing.	Total.
Factory—	60	20	5	5	5	5	—
Wide Bay, Cooroy	53	19½	5	5	4½	5	92
Warwick, Texas	53	19½	5	5	4½	5	92
Q.F. Company, Booval	53½	19½	5	5	5	5	93
Nanango Dairy Company	53½	19½	4¾	5	4¾	4¾	92½
Terror's Creek	52½	19½	5	5	4¾	5	91¾
Downs, Cressbrook	51½	19½	5	5	4¾	5	90¾
Caboolture (C.C.C.)	51	19½	4¾	5	4¾	5	90
Q.F. Company, Booval	50½	19½	5	5	5	5	90
Downs (Brook St.)	52½	19½	5	5	4½	5	91½
Pomona (C.C.C.)	51½	19½	5	5	4¾	4¾	90½
Oakey Dairy Company	52	19½	5	5	4¾	5	91½
Gayndah	51	19½	4½	5	5	5	90½
Logan and Albert	53½	19½	5	5	4¾	4¾	92½
Warwick, Texas	51½	19½	5	5	4¾	5	90½
Q.F. Company, Laidley	50	19½	5	5	5	5	89½
Maryborough, Kingaroy	51	19½	5	5	4½	5	90
Murgon	50½	19½	4¾	5	4½	3½	87¾
Eumundi (C.C.C.)	50	19½	5	5	5	5	89½
Downs, Clifton	50	19½	5	5	4¾	4	88½
Warwick, Allora	51	19½	5	5	4¾	4¾	90
Port Curtis Co-operative Dairy Co. ..	51½	19½	5	5	4¾	5	90¾
Esk Co-operative Dairy Company ..	51½	19½	4¾	5	4¾	5	90½
Q.F. Company, Grantham	52	19½	4¾	5	4¾	5	91
Warwick	49½	19½	5	5	4½	5	88½

FRESH BUTTER.

Class No. 5. Judge, Mr. E. Graham (Department of Agriculture).

Caboolture (C.C.C.), 94½ points	..	..	..	..	..	1
Esk Co-operative Company, 92 points	..	..	..	..	..	2
Queensland Farmers' Co-operative Company, 91½ points	..	..	..	..	..	3

The details were—

	Flav.	Tex.	Salt.	Colour.	Finish.	Packing.	Total.
Factory—	60	20	5	5	5	5	—
Logan and Albert	51½	19½	5	5	4¾	4¾	90½
Caboolture (C.C.C.)	54½	20	4¾	5	5	5	94½
Q.F. Company, Booval	52	19½	4¾	5	4½	5	90¾
Warwick, Allora	51	19½	5	5	4¾	5	90¼
Murgon	52	19½	4¾	5	4	5	90¼
Downs, Crow's Nest	52½	19½	5	5	4	4½	90½
Q.F. Company, Laidley	51¼	19½	4¾	4	4½	5	89
Esk Co-operative Dairy Company	53	19½	5	5	4½	5	92
Nanango Dairy Company	51½	19½	4½	5	4¾	5	90¼
Q.F. Company, Boonah	53	19½	5	4¾	4¾	4½	91½
Downs, Clifton	51¼	19½	5	4¾	4½	5	90
Pomona (C.C.C.)	47	19	5	5	4¼	5	85¼
Warwick, Texas	51½	19½	5	4½	4¾	4½	89¾
Q.F. Company, Grantham	52	19½	5	4¾	4¾	5	91
Maryborough (Kingaroy)	52	19½	4¾	5	4¾	5	91
Eumundi (C.C.C.)	51½	19	5	5	4¾	5	90¼
Wide Bay, Cooroy	51½	19	4½	4¾	4½	4¾	89
Terror's Creek	52½	19	5	5	4½	5	91

TWO EXPORT CHEESES.

Class No. 6. Judge, Mr. M. Wallace (Commonwealth Dairy Branch).

Factory.	Flavour.	Texture.	Colour.	Finish.	Total.
Downs (Unity, Warwick)	45	25	13½	9½	93
Greymare	43	25	14	9	91
Southbrook	45	24½	13½	9½	92½
Pittsworth	45	24	13½	9½	92
Mount Sibley	42	25	15	9	91
Downs (Unity, H.)	44	24½	14	9½	92
Gayndah	43	25	14	8½	90½
Pittsworth	46	24½	14½	10	95
Rosemount	42	24½	14½	9	90
Warwick (P.)	42	25	14½	9	90½
Rocky Creek	41	24½	14½	9	90

TWO MEDIUM CHEESES, UNDER ONE MONTH.

Factory.	Flavour.	Texture.	Colour.	Finish.	Total.
Moola Co-operative Dairy Company ..	43	24	14 $\frac{1}{2}$	9 $\frac{1}{2}$	91
Rocky Creek	41	24	14	9	88
Gayndah (Byrnestown)	44	25	14	9	92
Warwick (Pratten)	44	24 $\frac{1}{2}$	14	9	91 $\frac{1}{2}$
Downs (Westbrook)	44	24 $\frac{1}{2}$	14	10	92 $\frac{1}{2}$
Warwick (L.J.S.)	45	25	14 $\frac{1}{2}$	10	94 $\frac{1}{2}$
Downs (Jondaryan)	45	24	14 $\frac{1}{2}$	9 $\frac{1}{2}$	93
Downs (Hodgson Vale)	44	25	14 $\frac{1}{2}$	9 $\frac{1}{2}$	93
Pittsworth No. 1	45 $\frac{1}{2}$	24 $\frac{1}{2}$	13 $\frac{1}{2}$	9 $\frac{1}{2}$	93
Warwick (Victoria Hill)	43	24 $\frac{1}{2}$	14 $\frac{1}{2}$	9	91
Woodleigh	43	24	14 $\frac{1}{2}$	9	90 $\frac{1}{2}$
Downs (Koondai)	43	23 $\frac{1}{2}$	14	9 $\frac{1}{2}$	90
Pittsworth No. 2	46 $\frac{1}{2}$	25	14 $\frac{1}{2}$	9	95
Southbrook	43	24 $\frac{1}{2}$	14 $\frac{1}{2}$	10	92
Warwick (Boney Mountain)	45	25	14 $\frac{1}{2}$	9	93 $\frac{1}{2}$
Warwick (Greymare)	43	24 $\frac{1}{2}$	15	9	91 $\frac{1}{2}$

TWO MEDIUM CHEESES, OVER TWO MONTHS.

Class No. 8. Judge, Mr. M. Wallace (Commonwealth Dairy Branch).

Factory.	Flavour.	Texture.	Colour.	Finish.	Total.
Pittsworth No. 1	46	25	15	9	95
Downs (Hodgson Vale)	42	25	14 $\frac{1}{2}$	9 $\frac{1}{2}$	91
Gayndah (Byrnestown)	44	24 $\frac{1}{2}$	15	9	92 $\frac{1}{2}$
Downs (Koondai)	45	25	14 $\frac{1}{2}$	9 $\frac{1}{2}$	94
Warwick (Pratten)	43	24 $\frac{1}{2}$	14	8 $\frac{3}{4}$	90
Downs (Westbrook)	44 $\frac{1}{2}$	24 $\frac{1}{2}$	14	10	93
Warwick (L.J.S.)	44	24 $\frac{1}{2}$	14 $\frac{1}{2}$	9 $\frac{1}{2}$	92 $\frac{1}{2}$
Downs (Jondaryan)	44	25	14 $\frac{1}{2}$	9 $\frac{1}{2}$	93
Pittsworth No. 2	45	25	13	9 $\frac{1}{2}$	92 $\frac{1}{2}$
Warwick (Victoria Hill)	42	24	13	8 $\frac{1}{2}$	87 $\frac{1}{2}$
Woodleigh	46	24	14 $\frac{1}{2}$	9	93 $\frac{1}{2}$
Southbrook	45	24	13 $\frac{1}{2}$	9 $\frac{1}{2}$	92

TWO LOAF CHEESES, UNDER ONE MONTH.

Factory.	Flavour.	Texture.	Colour.	Finish.	Total.
Downs (Hodgson Vale)	44 $\frac{1}{2}$	25	14 $\frac{1}{2}$	9 $\frac{1}{2}$	93 $\frac{1}{2}$
Woodleigh	45	24	15	9	93
Warwick (Victoria Hill)	45	25	14 $\frac{1}{2}$	9	93 $\frac{1}{2}$
Downs (Westbrook)	44 $\frac{1}{2}$	24	14 $\frac{1}{2}$	10	93
Downs (Jondaryan)	44	24 $\frac{1}{2}$	14 $\frac{1}{2}$	10	93
Pittsworth No. 1	44	25	14	9 $\frac{1}{2}$	92 $\frac{1}{2}$
Downs (Koondai)	44	23 $\frac{1}{2}$	14 $\frac{1}{2}$	9 $\frac{1}{2}$	91 $\frac{1}{2}$
Rocky Creek	42	24	14 $\frac{1}{2}$	9	89 $\frac{1}{2}$
Warwick (Pratten)	43	24 $\frac{1}{2}$	14 $\frac{1}{2}$	9	91
Pittsworth No. 2	46	25	14 $\frac{1}{2}$	9 $\frac{1}{2}$	95
Warwick (L.J.S.)	46	24 $\frac{1}{2}$	14 $\frac{1}{2}$	9 $\frac{1}{2}$	94 $\frac{1}{2}$
Gayndah	43	24 $\frac{1}{2}$	14 $\frac{1}{2}$	9	91
Southbrook	43	25	15	10	93
Warwick (Boney Mountain)	43	25	14	9 $\frac{1}{2}$	91 $\frac{1}{2}$
Warwick (Jondaryan)	44 $\frac{1}{2}$	25	15	9 $\frac{1}{2}$	94

TWO LOAF CHEESES, OVER TWO MONTHS.

Class No. 10. Judge, Mr. M. Wallace (Commonwealth Dairy Branch).

Factory.	Flavour.	Texture.	Colour.	Finish.	Total.
Downs (Hodgson Vale)	43	25	14½	9½	92
Pittsworth No. 2	45	25	13	9½	92½
Warwick (Victoria Hill)	42	24	13½	8½	88
Downs (Westbrook)	43	24½	13½	9½	90½
Downs (Jondaryan)	44	24	13½	9½	91
Warwick (Pratten)	44	24	14	9	91
Downs (Koondai)	43½	24½	14	9½	91½
Pittsworth No. 2	44	24½	14	9½	92
Woodleigh	45½	24½	15	9½	94½
Warwick (L.J.S.)	45	25	14½	9½	94
Gayndah	43	24½	14½	9	91
Southbrook	45	24½	14	9½	93
Warwick (Jondaryan)	43	24	14½	9	90½

TWO MEDIUM CHEESES MADE FROM IMPASTEURISED MILK.

Factory.	Flavour.	Texture.	Colour.	Finish.	Total.
Moola Co-operative Dairy Company ..	44	24	14	10	92
Pittsworth No. 4	44	24	14½	9½	92
Warwick (L.J.S.)	44	25	14½	9½	93
Downs (Koondai)	42	24	14½	9	89½
Pittsworth No. 3	44	23½	14	9	90½
Downs (Westbrook)	43	25	14½	10	92½
Downs (Jondaryan)	43	24	14	9½	90½
Warwick (Pratten)	42½	24	14	9	89½
Gayndah (Byrnestown)	43	24	14½	8½	90
Downs (Hodgson Vale)	44	24½	14	9½	92
Felton	43½	25	15	10	93½
Warwick (Greymare)	43½	24½	14½	9	91½

BUTTER GRADING.

(Paper read by Mr. R. W. Winks, Chief State Grader, at the meeting of Butter and Cheese Factory Managers at Brisbane, 31st May, 1923.)

Now that the system of grading dairy produce has been in operation for about seventeen years, sufficient time has elapsed to form an opinion as to its value or otherwise to the industry. Previous to the introduction of grading, complaints continually came from London as to the quality of our butter on arrival there. Butter purchased here as first class, when it reached its destination, has been described as "rank pastry" totally unfit for ordinary table use.

Naturally, leading provision merchants and butter importers declined to handle our butter in the circumstances. One large firm that failed for £60,000 attributed its insolvency to extensive dealings in Australian butter. That the examination by disinterested inspectors at this end has been a big factor in altering for the better such an unsatisfactory condition of affairs I think few people will deny.

That the grader is looked upon at times as a kind of dairy policeman of the over-officious class, unsympathetic and unreasonable, ever on the watch to penalise the manufacturer, is an unfortunate misapprehension, which, I trust, the following remarks will help to dispel. Knowing as I do the innumerable difficulties a factory manager has to contend with, particularly in summer, when, owing to adverse conditions, it is impossible to make a first-class article from a big percentage of the cream and milk coming to hand, it is unquestionably the duty of the grader to help him whenever possible. To do otherwise would not only be a heartless and unjust proceeding, but would be in direct opposition to the spirit of the regulations in this connection. Irate suppliers, some of them enough to drive the average man mad, a directorate not all it should be, insufficiently equipped factories, &c., aggregate a list of troubles more than enough without the addition of a grader unduly severe in his judgments, even if otherwise competent.

I hear a voice, "What about short weights?" The examiner here, both under the provisions of the Commerce Act and the State Act, has no option but to impound as short weight any butter below the quantity stated in the trade description, even if it be $\frac{1}{2}$ lb. only. This, I consider, when only a few boxes in a large consignment are found deficient to that extent, is too hard; and the fine, if any, should at least be in accordance with the offence. The cost of stripping the packages, and the consequent deterioration of the butter, also longer storage charges, should, I respectfully submit, meet the oversight. Oversight I call it, for the day has passed when butter was intentionally packed short weight. The installation of expensive and sensitive weighing machines, and the care generally taken in this direction at most factories, are evidence of this.

Nevertheless, I still advise, as hitherto, the packing of 56 $\frac{1}{2}$ lb. butter net in each box purporting to weigh 56 lb., even when stamped "bare weight." Before leaving the question I might add that short weights are frequently due to faulty packing and excessive free moisture. The reason for mention being so seldom made of the former in the grader's memoranda, and nothing deducted from the total score of points, is that the butter is often graded before it has been weighed, or weighed and returned to the boxes by the attendants at the Cold Stores without the grader having seen them.

Grading, briefly defined, is the classification of the various butters and cheese into the different qualities known to the trade—Choice, First, Second, Third, and Pastry Grade. A maximum points choice butter is practically superfine, but as the latter is supposed to be faultless, such as, say, the best show samples, it is deemed advisable not to use the superfine stamp, at present, at any rate, especially in the case of butter destined for oversea, or that which might be held a considerable time before consumption. In fixing the grade of the butter before him, as soon as the grader has smelt and tasted a sample—provided the manufacture and condition be not extremely faulty—he should know into what particular grade the butter should be placed; but as purchases now are made on its points value, an additional responsibility rests upon the official examiner. A point, either too low or too high, means a loss to the factory or the purchaser. To reach unanimity in arriving at a recognised standard when the graders are not always operating together takes some time. This difficulty it is claimed has been overcome. As half the total of points is awarded for flavour and aroma, it emphasises the importance of these features as compared with the rest. No matter how well a butter may be made, if it be stale or otherwise unpalatable, it will not be relished by the average consumer. On the other hand, a butter no matter how good its flavour, with a squashy or very spongy body, and showing a very cloudy or milky brine, should not be classified as first grade. Such butter would not keep, and at the first exposure to high temperatures would, as you are all aware, rapidly deteriorate. The excessive amount of casein eventually leads to fermentation, and if kept long enough to absolute rancidity. Hence a butter with a good firm body, free from excessive moisture, always appeals to the grader. I am aware that in some districts where butter with a low melting point is produced it is almost impossible to submit a butter perfect in this respect. Certainly cold storage helps to disguise the weakness. The graders, however, do not as a rule penalise such butter on that account, merely stating in their memos. "body weak." Some factories, where the conditions referred to do not obtain, not infrequently despatch butter before it has sufficiently firmed up. The body is technically known as "sticky," and the core shows badly on the trier. Doubtless, want of space at the factory is mainly responsible for consignments being despatched in such an immature state; and we are often in a similar position here. When the Hamilton Cold Stores are available there will be ample space for butter such as that above described being held for a day prior to examination.

With regard to mottle, the least objectionable of the faults in butter, except when the defect is very pronounced, or, worse still, streaky, a butter is rarely penalised. When that is considered necessary, and to draw attention to the fact, say, in the case of a butter worth 92 points, half a point above its true value might be given for flavour and half a point taken off for mottle. The scoring reading 42 $\frac{1}{2}$ —30—19 $\frac{1}{2}$, thus avoiding the fraction in the total, and leaving the butter at what was considered its true value—viz., 92 points.

As to the cause of mottle, opinions are divided. It often happens that odd churnings from the same consignment are affected, while others show no traces of the defect. In the days when concussion churns were all the vogue, reworking was supposed to establish uniformity of colour, and since streak or mottle is rarely seen in unsalted butter, it was maintained by some that the bleaching was the result of partially dissolved salt and its unequal distribution. Yet with the combined churn and worker the trouble still exists more or less. May it not be possible that, where so many lots of cream of varying degrees of acidity, also creams of abnormally pale colour not being thoroughly mixed at the time of churning, might be in some way responsible?

The natural colour of Queensland butter is consistently good. Now and then very pale or bleached samples are met with, mostly due to innutritious food, and confined chiefly to unsalted lines of extremely low grade.

Occasionally complaints from dealers in the Southern States have been made as to Queensland butter being wood-tainted, presumably from unseasoned box timber. Comparatively green timber fresh from the saws undoubtedly would have this effect. The great majority of our factories, however, use only dry, clean timber. After carefully examining samples at this end, I believe that the peculiar turnipy flavour on the exterior of the butter in such cases is mainly due to inferior paper.

BLUE MOULD.

The sawn timber from hoop-pine is often stained a bluish colour in places, developed in the log, and in the early days of the sawmilling industry was paid for as second class on that account. A fair amount of it is seen in the packages, but it appears to be perfectly innocuous if kept dry.

Excessive free moisture, saturation from the ice troughs in the wagon overflowing, or exposure to rain in transit, accelerate blue mould, which next attacks the wrapping, and later on the butter. In a word, dampness is the chief source of this trouble.

There is evidence that the boxes, paper, and nails are unsuitably stored at some factories. Nails in particular, badly rusted from exposure to the weather, when driven at an angle often penetrate the sides of the butter and damage it. All such articles should be kept so as to be as free as possible from detriment or contamination of any description.

In salting and finish, in the majority of cases, there is little to complain of. Markings on the boxes are as a whole satisfactory. These should always be legible and neatly affixed. Under existing conditions an advice card for both the Commonwealth and State graders should accompany each consignment. In the event of the produce being examined for interstate purposes, only the State card need be presented. This, however, is generally attended to by the agents when preparing their notices of intention to export. The cards properly to fill their purpose must be correctly filled in, corresponding in every detail with the markings on the boxes; otherwise they are worse than useless. They should be placed in the brackets for that purpose, or left where the officials who select the test boxes will have no difficulty in finding them. It frequently happens that a full wagon has to be emptied before the cards are found lying on the floor of the car. This entails considerable inconvenience and labour to the men concerned, and, as it is unnecessary, causes much bad language.

And now, gentlemen, in conclusion, I might say that we welcome each and every one of you—directors, suppliers, or anybody interested—to witness the grading operations at their or your convenience. You may not gain much knowledge, but you certainly will not lose any. You will at least have the satisfaction of seeing your butter compared with that of other factories. In fact, I am firmly of the opinion that every factory manager, and, if possible, his head butter-maker, should visit the grading rooms at least once during the season to compare notes. I know that at the time when this would be most desirable from an educational point of view this may be easier said than done. Granting that, however, if it could be managed, the couple of days occupied by the trip would be well spent. Moreover, I believe that it would improve your opinion of both grading and graders.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS,
Assistant Botanist.

No. 21.

THE MAIDEN'S BLUSH.

The Maiden's Blush (*Sloanea australis*) is a fairly well-known "scrub" tree. Its common name is somewhat indiscriminately used by bushmen to designate trees with a pink wood. This tree is fairly well marked in the field, although our photograph is not a very good illustration of its typical shape. Mostly the trees lean to one side. They frequently grow on stream sides and overhang the water. The barrel is frequently irregular, being channeled or angular in cross section; it is also frequently somewhat flanged at the base in the larger trees. The bark is mostly brown and with a more or less marked tendency to be scaly. The heart wood is pink or reddish when freshly cut, and so far has not been used extensively. Coppice shoots are often seen on the barrels of the trees and are often useful to the field botanist, as they show the shape of the leaves and thus aid in the determination of the species. The trees are found in coastal "scrubs" from Illawarra, New South Wales, to Atherton, North Queensland.



Photo. by W. D. Francis.]

PLATE 111.—THE MAIDEN'S BLUSH (*Sloanea australis*).
A tree on Tambourine Mountain.

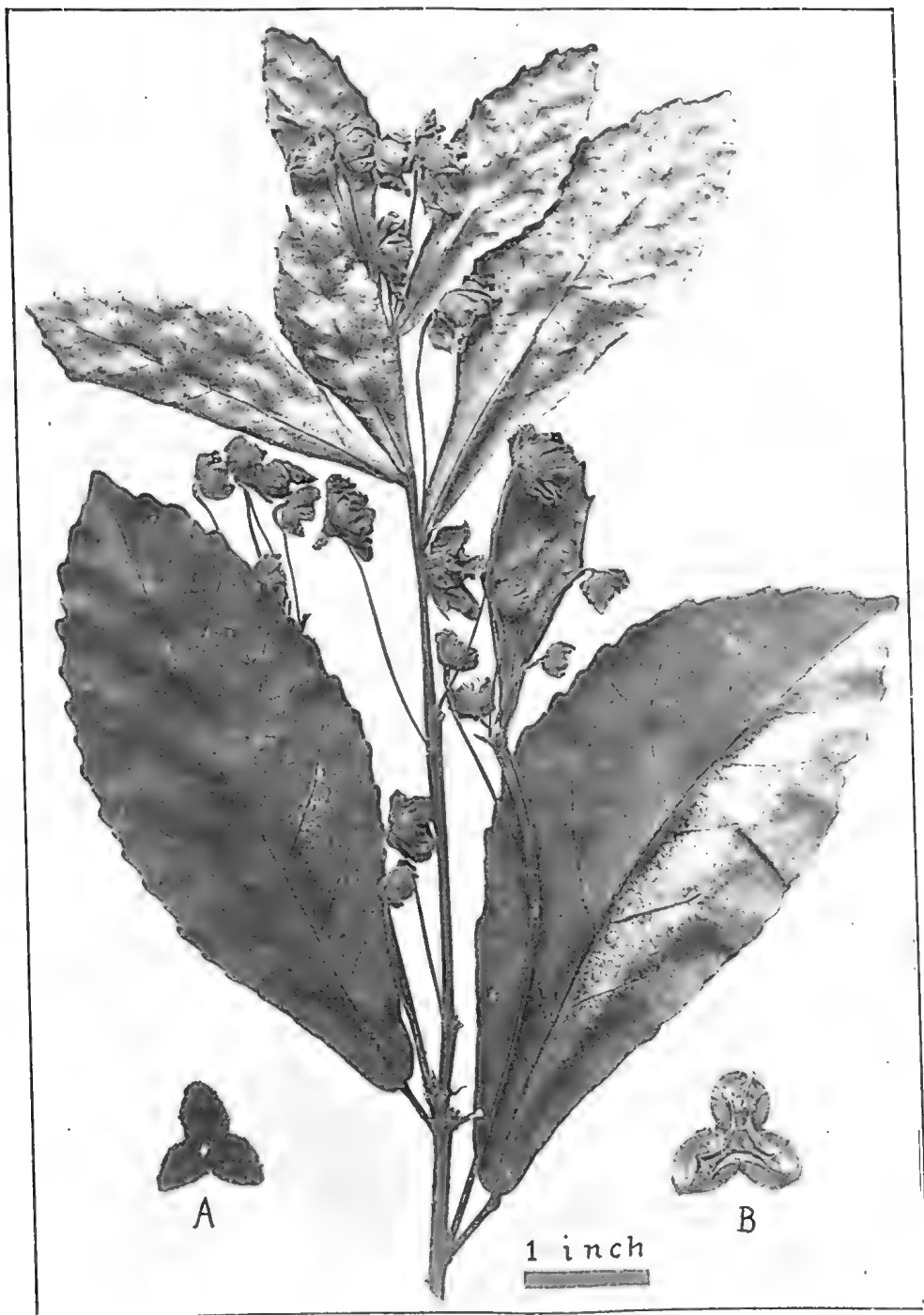


Photo. by Dept. Agriculture and Stock.

PLATE 112.—THE MAIDEN'S BLUSH, showing a Flowering Twig.
(A) Showing lower side, and (B) Upper side of expanded capsule.

DISEASES IN PLANTS ACT—NEW REGULATIONS.

Regulation No. 56 under "The Diseases in Plants Act of 1916," whereby the importation of certain fruits into the Stanthorpe Fruit District were restricted, has been rescinded, and a Regulation No. 57 has been issued in its place. This new regulation, which takes effect as from the 19th day of May, 1923, and shall remain in force until the 31st day of March, 1924, stipulates that the introduction of such fruits as apples, apricots, barberry, Brazilian cherry, cherry, citrons, custard apples, fig, gooseberry (Cape), granadilla, grape, guava, Kai apple, kumquat, lemon, lime, loquat, mandarin, mango, mulberry, nectarine, orange, paw-paw, passion fruit, peach, pear, persimmon, plum, and quince into that part of the State enclosed by the Southern Border and lines commencing at Cullendore Crossing on the border, passing through Silverwood, Mountside, and Granite Hill, and then due west through Gore to 151 degrees 30 minutes meridian; then south along the meridian to the border, from any district within which the common Queensland fruit fly, the spotted fruit fly, or the Mediterranean fruit fly are known to exist, is prohibited, unless such fruit has been in cold storage for a period of not less than twenty-one days at a temperature of not more than 35 degrees Fahr.

WEEDS OF QUEENSLAND.

By C. T. WHITE, Government Botanist.

No. 32.

CLEOME ACULEATA.

Description.—A small branching prickly herb, usually about 1 foot high, the young plants, stems, and leaf stalks clothed with a fine close glandular pubescence, the prickles (stipules) borne in pairs at the base of the leaves. Leaves dimorphic, those in the lower part of the plant on leaf stalks (petioles) of $\frac{3}{4}$ –1 inch, composed of three leaflets; leaflets elliptic, $\frac{1}{4}$ – $\frac{3}{4}$ inch long, the margins ciliate with short hairs. Leaves on upper parts of stem near the flowers simple, sessile or very short petiolate (stalked). Flowers small, about $\frac{1}{4}$ inch across, greenish white. Stamens slender, six. Capsule torulose, green, finely striate, $1\frac{1}{2}$ – $2\frac{1}{2}$ inches long; seeds numerous, cochleate (shaped like a snail's shell), longitudinally striate, and also marked here and there with rough, raised transverse lines.

Distribution.—A native of tropical America; a common naturalised weed in the East Indies and evidently introduced into tropical Queensland from either Java or Singapore. We first received specimens of the plant from Northern Queensland in 1904 when Mr. H. Newport sent in specimens as a weed in paddocks about Kamerunga.

Lately specimens have been sent in from Moolaba (Russell River) by the Rev. Norman Michael, and I have noticed it about Cairns during the past few years.

Common Name.—I know of no English name commonly applied to this weed.

Botanical Name.—*Cleome*, derivation doubtful, but generally believed to be a name applied by early Latin physicians to some herbaceous plant, though the exact species is not known to modern botanists.

Eradication.—*Cleome aculeata*, though it has been some time in the State, has not manifested itself as a bad weed and calls for no special method of eradication.

Botanical Reference.—*Cleome aculeata* Linn., Syst. Nat., 3, 232.

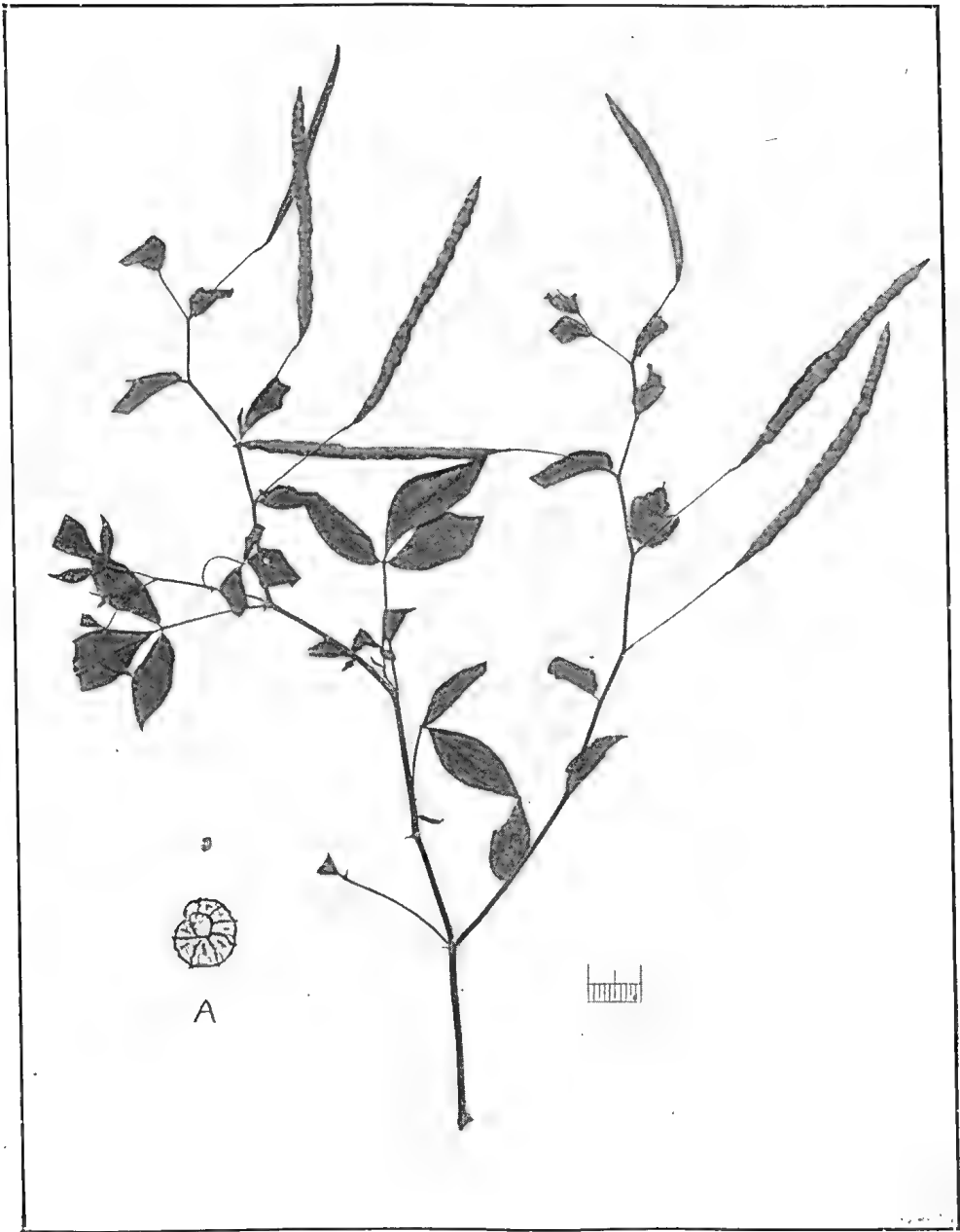


PLATE 113.—CLEOME ACUTEATA.
(A) Seed, natural size and enlarged.

STUD STOCK STUDIES.

BEST BREEDS OF PIGS FOR QUEENSLAND CONDITIONS.*

British Black.

This is the largest black-haired breed extant, and for a long time was known and used exclusively in the south-western counties of England.

The principal qualifications claimed for the British Black are: Ability to thrive under natural grazing conditions; its docility and extreme prolificness and capacity to mother its young; and the subsequent rapidity of growth and development of frame and flesh of the growing animals. These attributes combined make the breed a popular one in many parts of the globe.

In appearance the British Black pig is remarkable for its size, vigour, constitution, and characteristically large drooped ears, which together practically form a hood covering for the face and most of the snout. The skin is distinctly black, thin

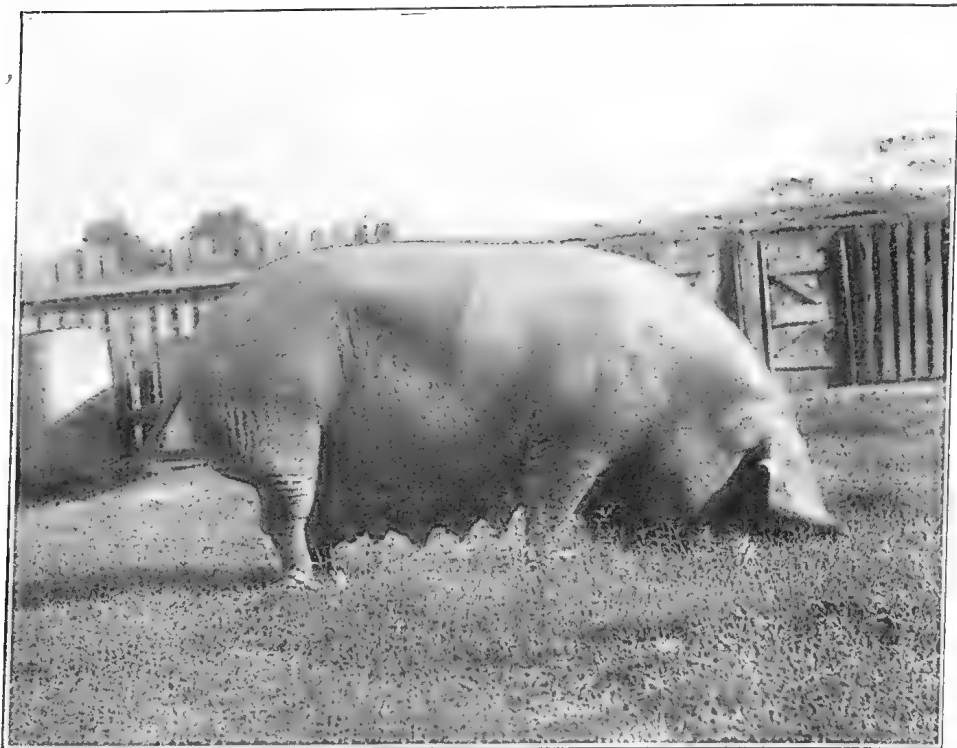


PLATE 114.—BRITISH BLACK SOW.

textured and supple, and grows a covering of rather fine hair. The pigment in the skin resists the scalding influence of the sun, a feature not to be disregarded in the selection of a breed of pigs to suit the existing climatic conditions of the warmer parts of this State.

The head is large, with prominent snout. Neck long and full, neatly set on to oblique shoulders, and tapering towards the under jaw. Body long, level, and deep, with well-sprung ribs; full, well-rounded loin, and deep sides. Quarters long, somewhat drooping, and with well set-on tail; hams full, and well let down. Legs straight, strong-jointed, with stout bone.

The brood sows are roomy, and possess exceptional capacity for the production and rearing of large litters, which ordinarily range from ten to twelve in number.

Further comment concerning this breed, and its value for cross-breeding purposes, is made elsewhere under the heading of "Cross-breeding for the Production of Pork and Bacon."

*From "Pig Raising in Queensland" (E. Graham and H. C. Quodling), Department of Agriculture and Stock, Queensland, October 1922.

Selection of Breeding Stock.

The Boar.—A matter of paramount importance is the selection of the boar. On no account should anything other than a pure-bred animal be chosen. Certain characteristics are indispensable, and these must be kept foremost in mind when seeking an animal which is capable of exercising such an influence for good or harm in the herd. In pig-breeding, as in the case of raising other domesticated animals, certain families or strains of blood stand out prominently because of their proven superiority to other representatives of the same breed, a circumstance attributable no doubt to the careful selection exercised by studmasters in employing animals of proper type, conformation, and unquestionable prepotency; factors which cannot be ignored when selecting animals for use in establishing, maintaining, and improving a herd.

Emphasis of the superiority of some families in this direction may be reiterated, because experience has shown that the ability to beget or give birth to large litters is also to be regarded as an inherent characteristic; consequently, in the selection of a boar, one should be obtained from a large litter.

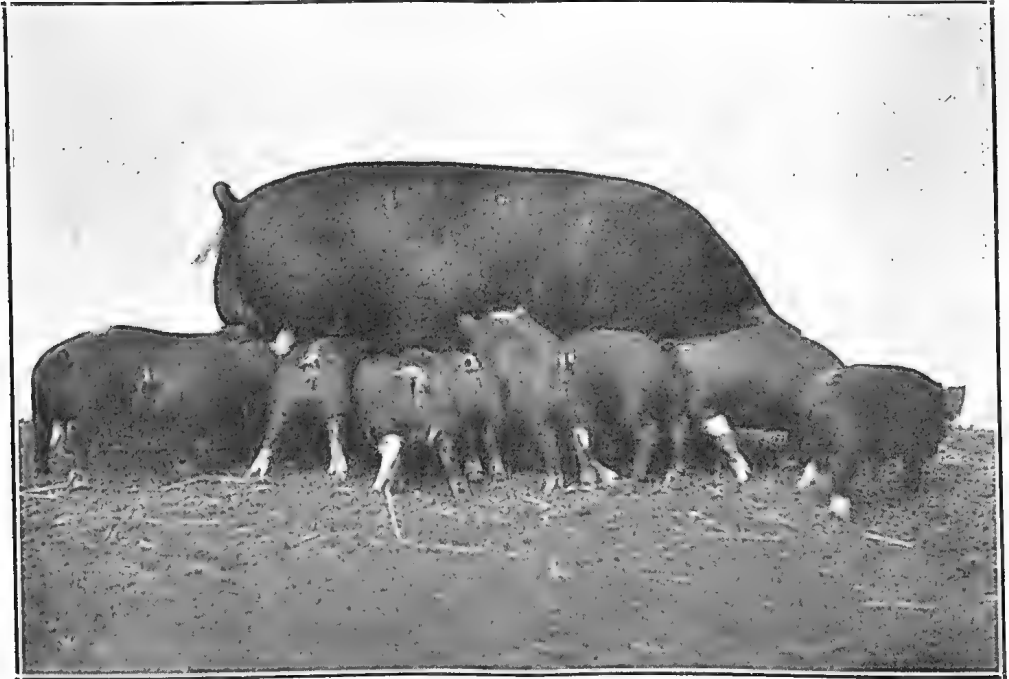


PLATE 115.—BERKSHIRE SOW AND LITTER.

Other indispensable adjuncts which require consideration are—

The parents and herd from which the pig is taken should be healthy; he should be of docile temperament; vigorous, showing evenness in quality, uniformity of conformation, and possessing twelve rudimentary teats; of correct colour and markings, and with decided masculine characteristics, and should be active, strong, and well developed. The age at which a boar may be used will depend to some extent on his development, and at nine months old, if well grown, he may be mated with a limited number of sows, and later on will, if properly cared for, be capable of dealing with from thirty to forty sows in the year.

Good food and water and plenty of exercise are essential to a growing animal, which demands a roomy, well drained and ventilated pen, provided with ample bedding, open to plenty of sunlight, and preferably in a situation affording opportunity to graze. After weaning, his food should consist largely of skim-milk, used in conjunction with pollard and succulent green food like lucerne and peas, with other farm-grown crops such as sliced pumpkins, mangels, sweet potatoes, artichokes, &c., to provide variety and nutriment. Later on, when four or five months old, it is permissible to use crushed and soaked grain of various kinds—barley, maize, wheat, cow peas, &c., with a small quantity, if necessary, of oil cake (previously scalded and allowed to soak for some hours).



PLATE 116.—LIGHT-WEIGHT BACONERS. (BERKSHIRE GRADES.)

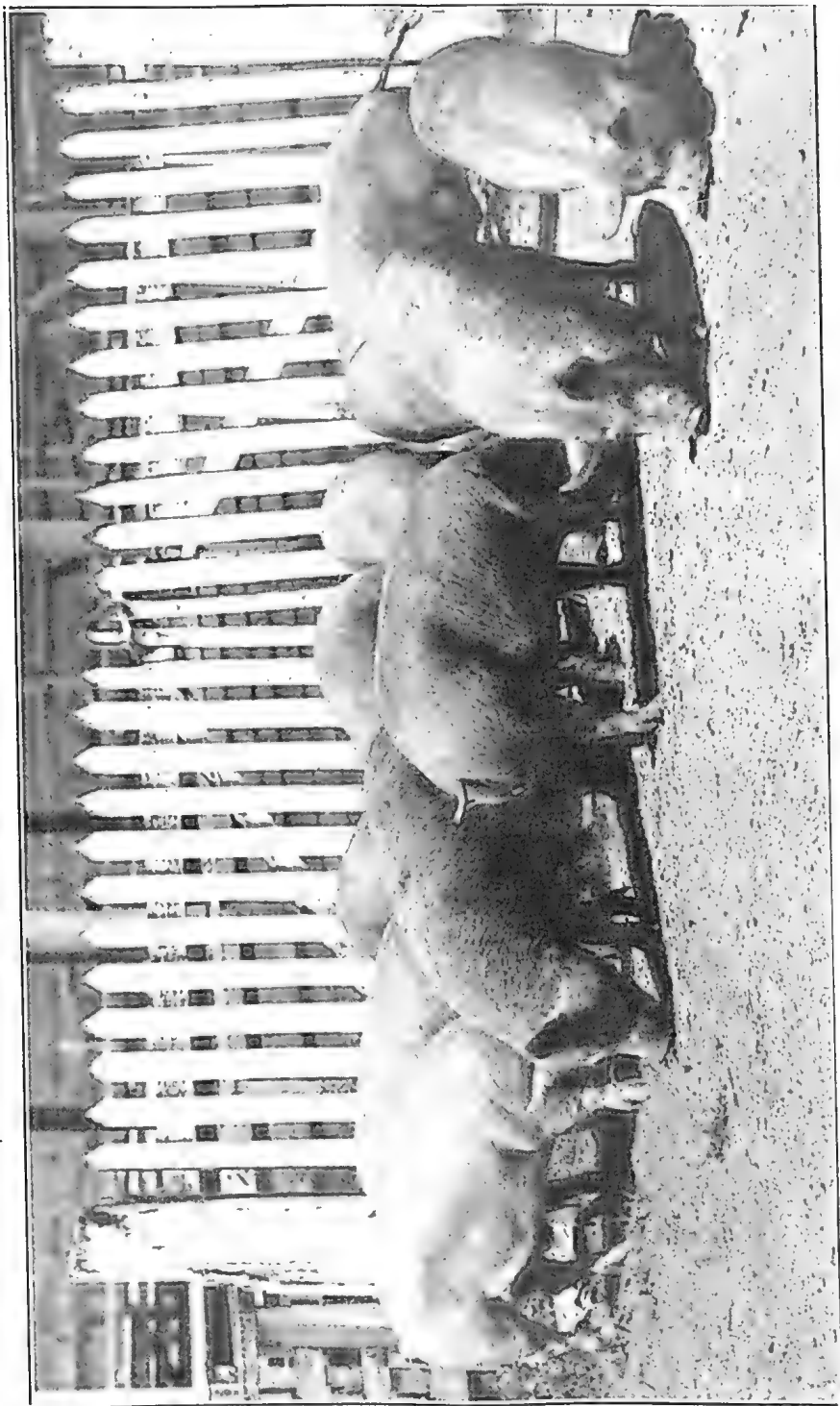


PLATE 117.—BACONERS. (YORKSHIRE GRADES.)

It is advisable to have the boar's pen and run some little distance away from the sows.

Regular feeding three times a day is advisable, but the complement of food given should not be sufficient to fatten the animal.

The Sow.—As the primary object of selecting brood sows is for the specific purpose of breeding stud stock, porkers, or baconers, the matter demands a deal of consideration and judgment.

The necessity of using a typical, pure-bred boar has been previously mentioned, and the employment on all occasions of pure-bred male animals cannot be too strongly emphasized. In the case of sows, however, for stud breeding, purity of blood is equally important, and as the raising of porkers and baconers does not demand the use of pedigree sows, but rather of those possessing special qualifications, a description of the type to be utilised is as hereunder:—

The animal must be sound, healthy, and bred from robust, healthy parents. She must possess an inherent maternal instinct, and natural capacity for producing and rearing large litters, in order that a maximum of profit may result. Certain outward and distinctive characteristics are associated with the above essentials, viz.:—The sow selected must be from a large litter, and from family strains known to produce large litters. Her colour, type, and appearance should be in close conformity with the characteristics of the breed she represents.

In temperament, she must be docile and contented, and unselfish when rearing her young.

She requires to be of an active, thrifty disposition, with a capacity to consume and assimilate large quantities of food to benefit the fetus and progeny rather than herself.

Soundness of constitution and robustness are indispensable, and these features should be associated with fine, rather flat shoulders, good heart room, width of hips, strongly developed spinal column, length and depth of body, and to have from ten to twelve well-placed and prominent teats; her whole appearance giving the impression of a natural roominess and capacity to carry, give birth to, and subsequently to suckle her young.

The antithesis of the true type of brood sow, and that which is to be avoided on all occasions when selecting for breeding purposes, is the short-necked, thick-shouldered, short-bodied, tight-looking, podgy animal of a selfish, lethargic temperament, that lacks the effeminate and true maternal instinct, which in this class is dominated by the inherent tendency to lay on flesh and fat.

PROPOSED APPOINTMENT OF A CITRICULTURIST.

Interviewed recently as to the likelihood of a visit to Queensland by Dr. H. J. Webber, Professor of Sub-tropical Horticulture, University of California, the Minister for Agriculture (Hon. W. N. Gillies) stated that when Mr. J. D. Story was recently in America, he (Mr. Gillies), at the request of the Council of Agriculture, communicated with him and requested him to make inquiries as to the possibility of obtaining a citriculturist for Queensland. Mr. Story conferred with the leading Californian authorities on the subject, and ultimately four names were submitted. The salaries required, however, were exceedingly high. Mr. Story advised the Minister that there was a possibility that Dr. Webber, who is regarded as one of the best citrus authorities in America, would be willing to spend a year in Australia if his expenses were defrayed; during that period Professor Webber would be enjoying his leave under the Sabbatical leave arrangements of the University of California. Mr. Story suggested that the question of the appointment of a citriculturist should remain in abeyance, but that Professor Webber should be asked the conditions under which he would be willing to spend, say, six months in Queensland, inquire into the citrus industry generally in this State, and furnish a report thereon; the visit to be arranged under the auspices of the Department of Agriculture, the University, and the Council of Agriculture. Mr. Gillies said that he had approved of these proposals, and that the University Senate and the Council of Agriculture had also concurred regarding the suggested visit of Dr. Webber. Mr. Gillies has written to Professor Webber, and his reply is now awaited.

THE BANANA BEETLE BORER—V.*

By JOHN L. FROGGATT, B.Sc., State Entomological Staff.

Mr. Froggatt is specially investigating the history and habits of the Banana Beetle Borer, and subjoined is his fifth progress report, which has been made available by the Minister for Agriculture and Stock (Hon. W. N. Gillies).

With the advent of a greater realisation of the menace of the Banana Beetle Borer to the banana industry, closer attention is being paid to the individual plantations, with the result that our knowledge of the dispersion of the pest is becoming greatly enlarged. It is still, however, far from being complete, and too strong an emphasis cannot be laid on the fact that the only way in which the problem can be handled successfully is to know the exact limits within which infestation lies. Without this information, no satisfactory control can be exercised over the distribution of banana suckers; this is undoubtedly the greatest means by which the pest is spread from one district to another. It is obviously impossible for one, or even several inspectors to examine the whole of our banana growing areas in anything like a reasonable time, and still more to keep in touch with them continuously. With the active co-operation of the various Fruitgrowers' Associations much valuable information could be obtained, but in only extremely rare instances has this been given. The greater the degree of unity in tackling the pest, the more far-reaching and lasting will be the results obtained.

Once this pest obtains a footing, it is only by constant and continuous vigilance that it can be brought and kept down to a minimum. Control measures cannot be carried out for a little while and then allowed to lapse if lasting benefit is to result. They must be continuous and thorough to be efficient. Although the life of the beetles is a very long one, there is one point in its habits which is of great help in combating it, viz., that it has two distinct periods in the year when it is most actively breeding, from March to May, and from September to November; in the intermediate months but few eggs are laid. This allows a considerable time during which cultural methods of control can be employed with good effect.

During adverse climatic conditions, especially when these are protracted, the effect on the plants, due to grub attack, is greater than in a normal season. This is due to the plant having two adverse factors to contend with—1st, insufficiency of necessary plant food; 2nd, loss of portion of its storage capacity, brought about by the action of the grub in the butt of the plant.

The beetle lays one egg at a time in the bottom of small separate burrows eaten out of the plant, generally about ground level, where they lie just beneath the surface. After several days (6-10 during the active breeding periods) the young grub eats its way out and tunnels into the plant, working gradually into the corm.

It is in this stage that all the harm is done. During part of its life it tunnels through the outer portion of the bulb; while cutting its track, some of the beginnings of the roots are either cut off or damaged; this causes the whole root to die. The effect is twofold. Firstly, the plant loses a certain amount of food through loss of roots and has to use up reserve stores to send out fresh ones. Secondly, when this dying back of the roots is bad, the plants have not enough support in the ground, and fall down. The remainder of the life of the grub is passed in the heart of the bulb, where it destroys a large amount of tissue, thus decreasing the food-storage capacity. Then, also, decay often sets in along these tunnels, still further destroying the bulb. All these factors combine to reduce the vitality of the plant, which has not, in many cases, sufficient strength left to yield a profitable bunch; even if it does not go to such lengths, the number of fruit developed may be considerably decreased and the quality be greatly inferior to what it would have been if the plant had been unaffected by the borer. Where the tunnels are carried into the upper portions of the corm, the central core (*i.e.*, the bunch-stem) may be tapped, resulting in it decaying upwards from the base. In the later stages of the life of the grub it tunnels towards the outer portion of the bulb, coming to rest just underneath the surface, where it lies dormant for two to three days, before turning into the pupa. This is a resting stage, during which the change to the beetle takes place, occupying from five to eight days. When the beetle comes out it is very light coloured and soft; before leaving the corm, it remains in the pupal chamber for about eight days during which time its colour has turned to a dark reddish-brown, or black, and its body has become hard. Mating and egg-laying take place within forty days in the more active periods of the year.

* I., Q.A.J., Sept., 1921, Vol. XVI., pp. 200-208.

II., Q.A.J., May, 1922, Vol. XVII., p. 240.

III., Q.A.J., Oct., 1922, Vol. XVII., p. 279.

IV., Q.A.J., Feb., 1923, Vol. XIX., pp. 68-72.

It is not uncommonly stated that the grubs do not attack living plants and are only found in the old bulbs and corms. This is a complete fallacy, as many growers know to their cost.

It is undoubtedly a fact that this pest is markedly on the increase; more especially is this the case where little or no attention has been paid to carrying out control measures, or else where such have been begun and then neglected. It also cannot be denied that in some localities the beetle has not increased as it might have been expected to do and as it has done in other areas. Careful examination has so far failed to indicate any signs of a parasite, except in the one locality mentioned in the first report published in July, 1921, where the beetle is still prevalent.

The females deposit eggs throughout the greater part of their life, so that the period over which they are capable of continuing and increasing devastation to a plantation is very prolonged.

No variety of banana plant is immune from the attacks of this pest, nor does there seem to be any difference in the relative frequency, or severity, of its depredations in different varieties.

Owing to the whole of the development of the beetle, from egg to adult, being passed inside the plant, leaving no openings on to the surface, all ordinary methods applicable to insect control fail.

So far it has not been possible to carry out tests for plant treatment. All the research work has been devoted to ascertaining the best methods for preventing any increase of the pest in the plantation.

Checking multiplication demands a knowledge of all places where the beetle can breed. It has not been found to develop in anything other than banana plants. In nearly every plantation, one will find numbers of old stems and often corms lying on the ground. These are all ideal places for the pest to breed in, and increase far beyond what would occur if they were rendered unsuitable. They also act as shelter for the beetles. As these have a great value as humus, all growers do not like to burn them, even if wood is available. But if they can be quickly dried, the necessary requirements will be fulfilled. If the corms are split into small pieces, the stems cut up lengthways, and left exposed, the heat of the sun will rapidly remove all moisture and leave them too dry and tough to be any use to the beetles. One objection often raised to this system is that the adult insects will be driven into the standing stools. What if they are? They will then be localised in definite centres, instead of being scattered all over the place, and can be then trapped far more readily, and with a considerable saving of time and labour. Old butts, or decaying stems, left standing in the stools form not only favoured breeding sites, but also constitute further shelter for the beetles, and which they appear to prefer above all else. As old infested butts decay, or are eaten out, the grubs travel into the suckers, or plants, which have grown out from them. These, therefore, should also be removed and destroyed.

It must not be thought that burning these plant-portions is deprecated, for this is by no means the case. It is fully recognised and advocated as the most complete method of destruction possible.

Experiments have been begun to ascertain whether it is possible to drive the beetles in the soil away from the stools, the tendency being for them to move towards the surface. If any such successful means can be elaborated, trapping would be made much more effective, as well as setting a protective barrier around the stool.

Trapping.—This consists of placing split pieces of banana corm, or stem, flat on the bare ground, in or just outside infested stools or wherever cut stems or corms are found showing signs of infestation. The beetles come to feed on these baits and congregate either on the underside of them or just underneath the surface of the soil. The baits should be examined as often as possible, up to once a day, in the morning for preference, as the maximum number of beetles will then be obtained.

A considerable amount of work has been done in testing the effects of various poisons, when applied to corm baits, on the beetles. The main points that have to be considered are—

- (1) That the poison must be a cheap one, and readily obtainable.
- (2) That it must kill the beetles after feeding for only a short time on the treated material. Some of the poisons have been used in solution, others as dry powders. Amongst the latter were several that are practically insoluble; others were used as a check against the same chemicals in solution.

Those used in solution have proved very unsatisfactory. Some of the dry powder poisons, on the other hand, have given results, under laboratory conditions, that are most promising. A considerable amount of work remains to be done along

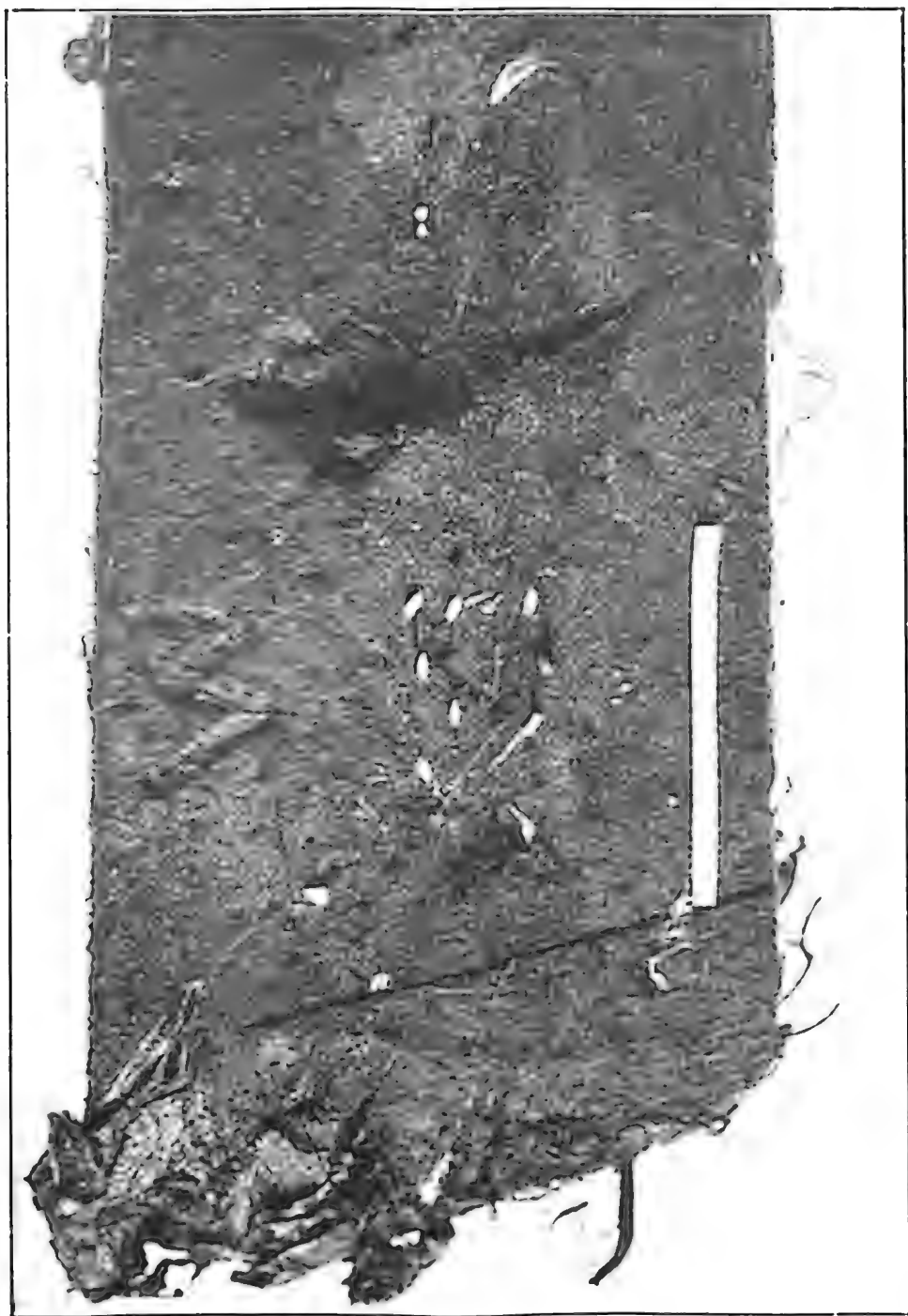


PLATE 118.—EGGS OF BANANA BEETLE BORER EXPOSED FOR EXAMINATION.

these lines, however, before definite conclusions can be drawn. Field tests will then be carried out and recommendations, if any, made in due course.

In the laboratory experiments a definite number of beetles were exposed to the poisoned corm for certain periods of time, at the expiration of which they were transferred on to fresh food and examined from day to day to ascertain results.

The most satisfactory poison tested to date has been Paris green, killing 97.5 per cent. in an exposure to the treated corm of 3 to 7½ hours. After feeding on the poisoned material for 18 to 48 hours the pure powder killed 99.4 per cent.

Arsenite of soda in solution of a 2 per cent. strength (1 lb. to 5 gallons water) only accounted for 10.5 per cent. of the beetles in 18 to 48 hours exposure. When used as a finely ground powder, it destroyed 92.5 per cent. of the beetles with an 18 to 54 hours period.

Borax proved to be a slow-acting poison. Used dry, and finely ground, it killed 94.4 per cent. of the beetles in 18 to 66 hours, but only 48.75 per cent. over a 3 to 24 hours period. It would thus seem that the beetles have to consume a considerable amount of the poison before death ensues.

Calcium arsenate used pure destroyed 68.75 per cent. over a period of 18 to 48 hours.

Time of year exercises a great influence on the destructive effect of poison—due probably to the more quiescent habits of the beetles in the cooler weather.

For example, pure dry borax killed 85 per cent. of the beetles in July and 94.4 per cent. in November over similar periods of exposure to the poisoned corm. It is thus evident that the greatest attention should be paid to the poisoning during portions of the year when the beetles show their greatest activity.

The simplest way to detect the presence of beetle borer, at any stage beyond that of the egg, is to cut open stems, or old corms, on the ground, or butts in the stools. If the pest is present, the tunnels made by the grubs will be found and probably also the grubs and beetles. The tunnels for the most part are tightly packed with the chewed-up plant material which the grub has passed through its body; when dry it is like sawdust. The tunnels may be cut straight across, when they appear as circular holes, or cut at an angle, appearing more elongated. If there is any doubt, specimens sent to the Entomologist-in-Charge will be examined, and full information sent in reply.

Before laying out a plantation, two very necessary precautions to be observed are—

(1) That the site selected is not close to, or adjoining, an infested banana area. Where this has been inadvertently done, precautions must be taken to prevent the pest spreading into the new portion.

(2) That the plantation from which the suckers for planting are to be obtained is free from the beetle borer. Whenever possible take the further precaution of never permitting the suckers after removal from the stool to remain on the ground overnight. If infestation is slight, it can quite easily be overlooked unless the examination for it has been very thorough. Should this oversight have occurred, these suckers will act as baits, and beetles attracted to them may deposit eggs. Though perfectly free from the pest when dug, they may be, in whole or in part, infested when carted away.

Many instances have been noticed where plantations have been started alongside of older infested ones. Sooner or later, as the supply of plant material diminishes, the beetles will begin to migrate into the new area where there is abundance of the food, and breeding grounds which they require. Wherever this condition of affairs is found to exist, lines of corm baits should be laid between the old and new areas. They must be carefully and systematically examined, so that they may form an effective means of preventing the ingress of the pest. Whenever possible steps should be taken to get the old area cleaned up. An examination of the suckers for beetle borer infestation, unless fairly well developed grubs are present, is an impossible task, because the egg and very tiny grubs are so difficult to detect. In order to examine them thoroughly, the suckers would have to be cut about to such an extent as to render them useless for planting. Even if it were feasible on the above conditions, the time that would need to be taken to examine them thoroughly would be so great as to render the task an impossible one.

Butts, which are often used for planting, offer better facilities for examination, because, when present, the grubs, or their tunnels, will readily be seen when the corm is cut open.

A brief description of the different stages in the life history of the beetle, although it has been given before, should be of interest, for we are constantly being asked what the grub and beetle are like.

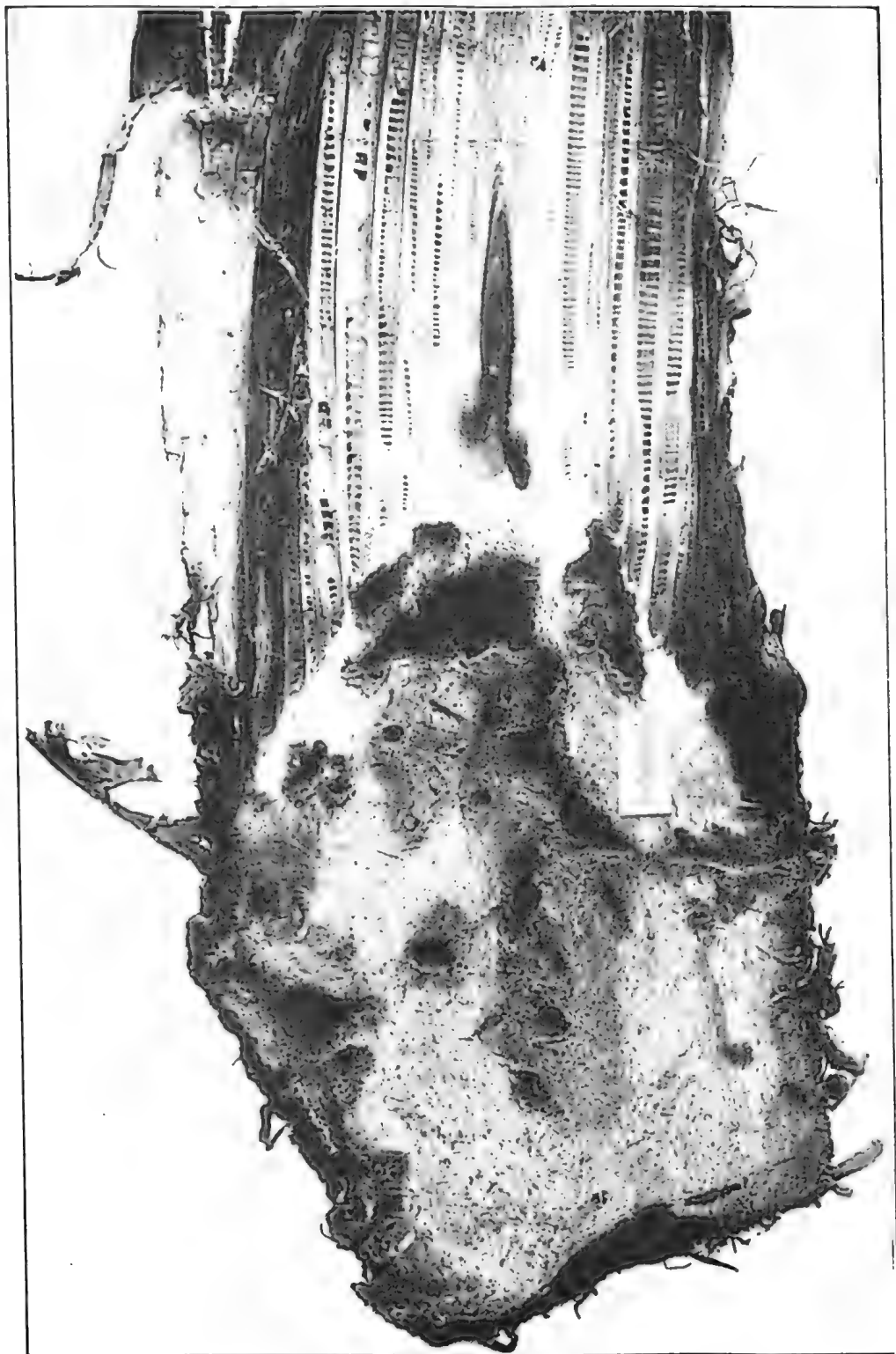


Photo: Dept. of Agriculture and Stock.]

PLATE 119 — BUTT OF BANANA PLANT.

Showing effect of infestation by *C. sordidus*. Scale, 2 centimetres (2 cent. = 1 inch).
Note—(1) tunnelling in outer part of corm; (2) plant decay spreading from grub tunnels in centre of corm; (3) destruction of central core of plant by grubs.

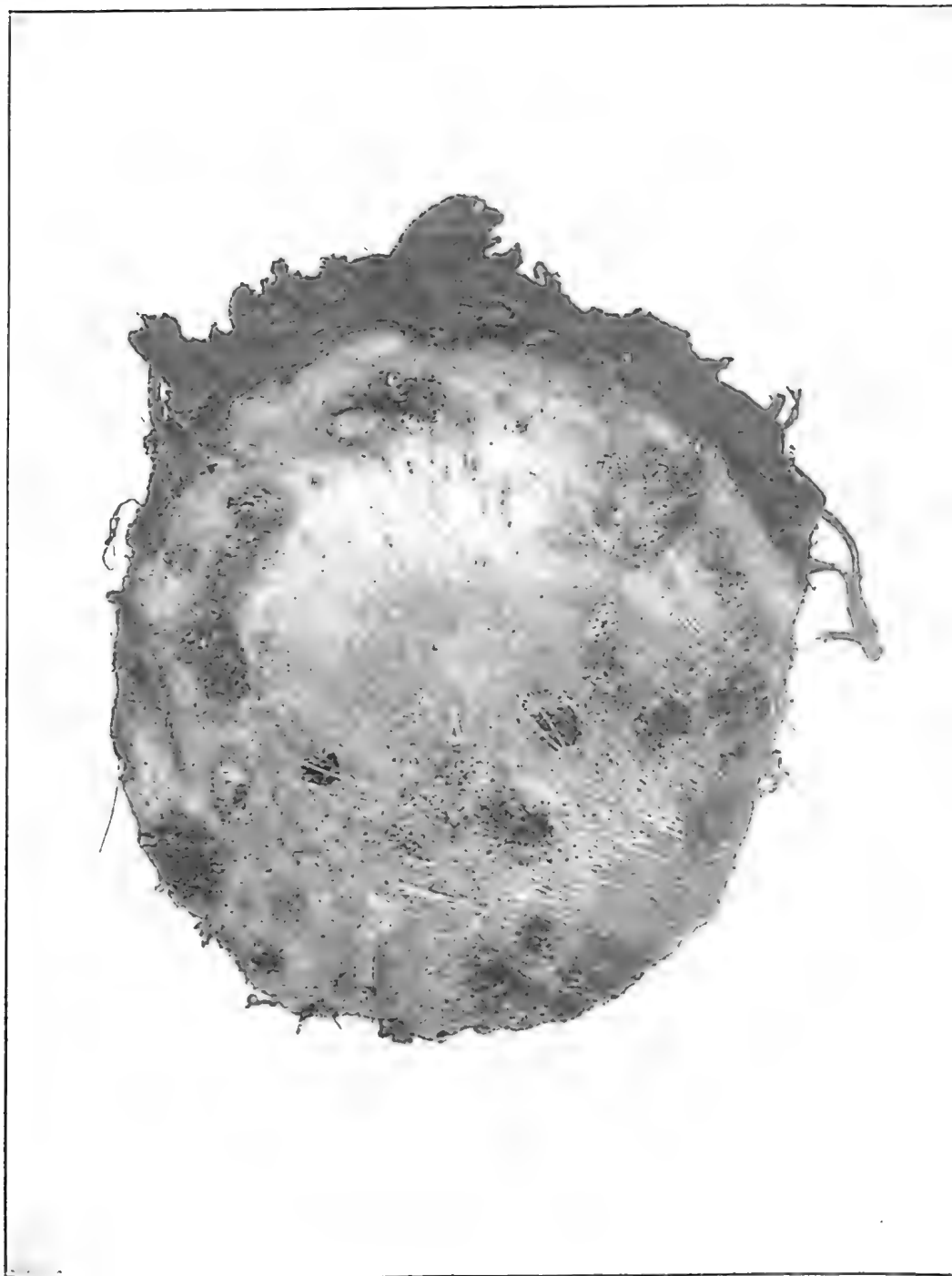


PLATE 120.—INFESTED BANANA CORM, SHOWING GRUB TUNNELS.

The Egg is white and about one-twelfth of an inch long, being elongate with rounded ends.

The Grub, when full grown, is slightly more than half an inch long; it is a thick, legless, white grub with a reddish-brown head.

The Pupa (or chrysalis) is white and about half an inch long; the outlines of the beetle are plainly shown in this stage.

The Beetle, when mature, is black in colour, somewhat less than half an inch in length, with a slightly curved trunk projecting in front, and is extremely hard. When disturbed, it lies as if dead, with the legs drawn up against the body, for a considerable time. It has often been stated that the beetles fly. Laboratory and field tests have, so far, given negative results, but any information of observations made by growers on this matter will be welcomed. It is possible that it may fly at certain times of the year, but this is still only supposition. It is not attracted to light.

The main points to remember in fighting this pest are—

(1) The beetles have a long life and the females deposit eggs during the greater part of it. Therefore, catch and kill them as soon after they leave the plant as possible, thus reducing the number of eggs that may be laid.



PLATE 121.—GRUB PUPA, AND ADULT OF
BEETLE BORER.
(Natural s.zo.)

(2) During the heat of summer, and cold of winter, breeding is much less than in the spring and autumn. There are thus two periods of the year when a great deal can be done to check the depredations of the beetle, while it is more or less inactive.

(3) Keep a close watch for signs of infestation in the stools, and wherever found, remove the portions attacked, and destroy them. Lay corm baits on these spots, and keep at it until no beetles are trapped for several days in succession. When infested stems or corms are found on the ground, they too must be destroyed and baits left in their place.



PLATE 122.—EGGS OF *C. sordidus* TRANSFERRED FOR OBSERVATION.

PLATES.

118. Egg.

119. Plate 54, October, 1922. (Butt of Banana Plant, showing effects of infestation. Scale: 2 centimetres (2.5 centimetres to 1 inch). Note: (1) Tunnelling in outer and inner parts of corm; (2) Plant decay spreading from grub tunnels in centre of corm; (3) Destruction of central core (bunch-stem) by grubs.

120. Plate 22, February, 1923. (Infested Banana Corm, showing grub tunnels).

121. Plate 24, February, 1923. (Grub Pupa and Adult of Beetle Borer; natural size).

JOHN L. FROGGATT, B.Sc., Entomologist.

THE FRUIT INDUSTRY EDUCATIONAL WORK.

Recently the Chief Instructor in Fruit Culture (Mr. J. M. Ward) and the Packing Instructor (Mr. W. Rowlands) visited the Cleveland and Redland Bay fruit districts for the purpose of giving practical instruction to growers on matters pertaining to the fruit industry generally. Mr. Ward also lectured in the local schoolroom on subjects of vital importance to growers in these districts. Many individual orchards were visited where, in some instances, a number of custard-apple trees were found to be suffering from one of the root-rot fungoids. Growers were shown how to combat this disease in a practical manner. As this trouble is prevalent to some extent in the Cleveland district, arrangements were made for Mr. R. W. Peters (Assistant Instructor in Fruit Culture) to spend at least a week or two in the locality for the purpose of giving individual instruction in this and other subjects in connection with fruit trees. Fruitgrowers expressed their appreciation for this arrangement. Demonstrations were given by Mr. Rowlands in the packing of pineapples, custard apples, oranges, mandarins, lemons, and tomatoes. At these demonstrations the question of improving the packing of pineapples was gone into in detail. Many valuable suggestions were offered by several growers who have given this subject considerable attention.

At Redland Bay a large number of growers assembled at the packing shed of Mr. Jas. Collins for the purpose of witnessing Mr. Rowlands pack and grade oranges in the new citrus case. The meeting was at first anything but favourable towards the

new citrus case, but after witnessing the method of packing, as demonstrated by Mr. Rowlands, one and all were more than favourably impressed with the ease and pack. Growers generally were very appreciative of the work of the visitors, who were asked to again visit the district for the purpose of delivering lantern slide lectures and holding fruit-packing classes, and an arrangement was made for Mr. Ward to lecture on 31st July, as this was the earliest date available. Mr. Peters was also in the Redland Bay district recently, and did good work in a number of local orchards.

HISTORIC BANANAS.

The two bunches of bananas which were produced at the recent meeting of the Chambers of Commerce just at the psychological moment assisted materially to sway the opinions of the delegates in Queensland's favour. They may be regarded as appropriate reminders of the fight for maintenance of adequate tariff protection. These bananas were from the Blackall Range, and contained 39 dozen. They were hurriedly selected by the markets officer of the Council of Agriculture, in conjunction with a representative of the S.Q.F.S., Limited, from supplies sent to Brisbane markets for sale that day.

Fine as these specimen bunches were, there were even better bunches on the market from the Brookfield district, but these were unprocurable.

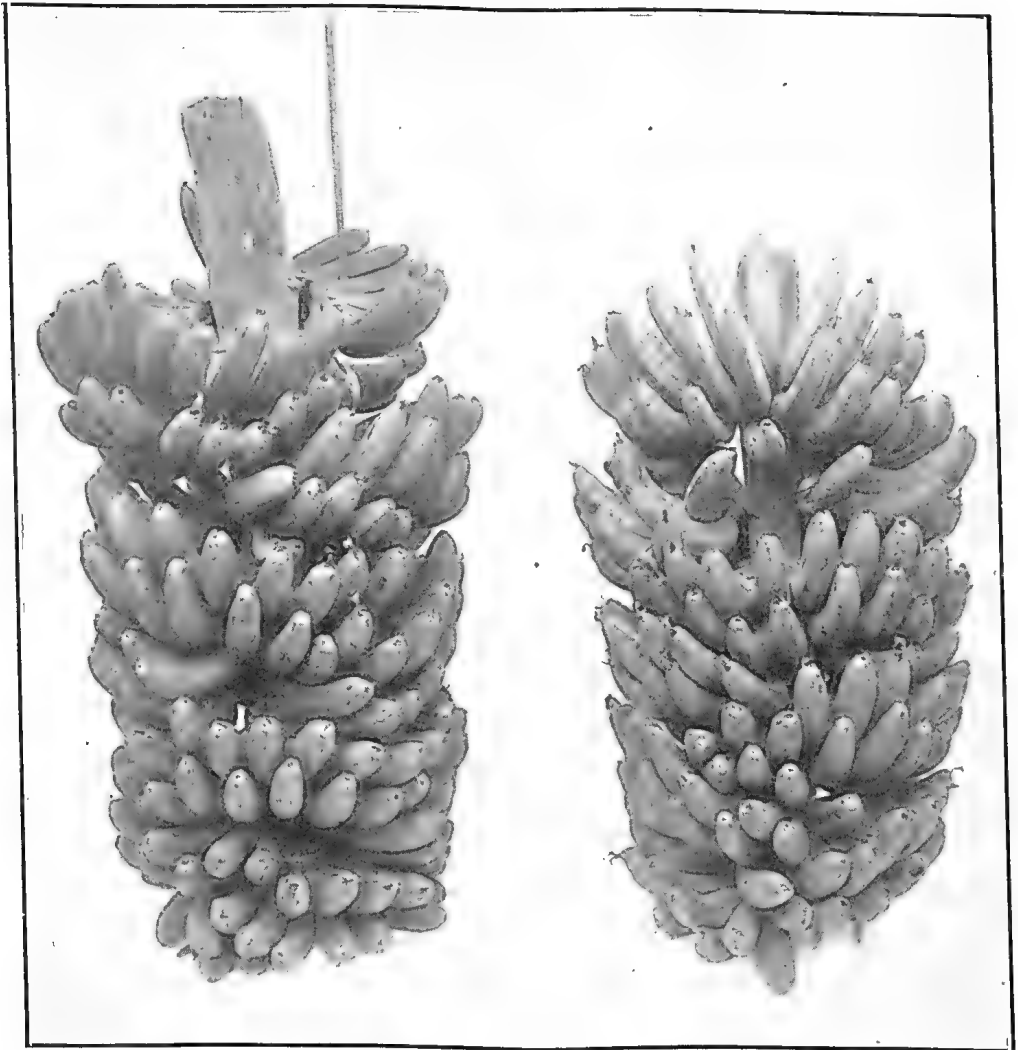


PLATE 123.—A FRUITFUL ARGUMENT IN FAVOUR OF TARIFF PROTECTION FOR QUEENSLAND BANANAS.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, MAY 1923.

The weather conditions during the month have not been satisfactory for egg production. The sudden and varied changes in weather have, to some extent, upset the competition birds, but it is pleasing to note how some of the hardier keep to their work and have put up some good scores. Where the scores are small, this is due in some cases to the birds going into moult, also to the fact that many were on the young side when sent, and these are just commencing to lay. The appetite of the competitors is much better than it was, and nearly all the pens have settled down to business, and should do well. The following are the individual records:—

Competitors.	Breed.	May.	Total.
LIGHT BREEDS.			
*C. H. Singer	White Leghorns ...	123	209
*S. L. Grenier	Do.	108	200
*W. and G. W. Hindes	Do.	122	197
*N. A. Singer	Do.	118	195
Jas. Hutton	Do.	90	190
*J. W. Newton	Do.	106	186
*Rock View Poultry Farm	Do.	102	182
*Oakleigh Poultry Farm	Do.	101	181
*Ancona Poultry Club	Anconas	111	179
*O Goos	White Leghorns ...	101	178
Beckley Poultry Farm	Do.	94	174
*J. W. Short	Do.	86	164
F. Sparsholt	Do.	108	161
*R. C. J. Turner	Do.	83	157
Jas. Harrington	Do.	80	157
*J. M. Manson	Do.	100	150
G. Marks	Do.	95	149
W. A. and J. Pitkeathly	Do.	61	148
G. E. Rogers	Do.	83	146
*Mrs. L. Andersen	Do.	92	145
*Bathurst Poultry Farm	Do.	101	145
*G. Williams	Do.	84	138
*Arch. Neil	Do.	82	137
*H. P. Clarke	Do.	100	130
*H. Fraser	Do.	79	130
Jas. Earl	Do.	80	126
*A. C. G. Wenck	Do.	88	125
*Mrs. R. E. Hodge	Do.	66	125
W. Becker	Do.	90	120
C. Quesnell	Do.	61	117
Chapman and Hill	Do.	63	116
W. and G. W. Hindes	Brown Leghorns ...	62	114
*C. A. Goos	White Leghorns ...	77	102
*Mrs. E. White	Do.	69	100
E. Ainscough	Do.	50	94
Parisian Poultry Farm	Do.	50	72
J. Purnell	Do.	48	63
N. J. Nairn	Do.	40	56
HEAVY BREEDS.			
*W. Becker	Chinese Langshans ...	107	209
*Jas. Hutton	Black Orpingtons ...	108	181
*R. Burns	Do.	109	180
*Mrs. A. E. Gallagher	Do.	98	171
*Jas. Ferguson	Chinese Langshans ...	110	170

* Indicates that the pen is being single tested.

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	May.	Total.
HEAVY BREEDS— <i>continued.</i>			
R. Conochie	Black Orpingtons ...	86	170
J. R. Douglas	Do.	87	168
*E. Walte	Do.	103	161
Beckley Poultry Farm	Do.	82	159
*Jas. P. ter	Do.	106	157
Mrs. A. Kent	Do.	93	144
*H. M. Chaille	Do.	72	139
W. T. Solman	Do.	95	137
*Parisian Poultry Farm	Do.	101	136
*J. H. Jones	Do.	84	134
*E. F. Dennis	Do.	70	133
*R. Holmes	Do.	68	127
*T. Hindley	Do.	87	122
*Rev. A. McAllister	Do.	80	112
H. B. Stephens	Do.	60	101
W. G. Badcock	Ch. Langshans	70	96
Jas. Ferguson	Plymouth Rocks	95	95
G. E. Rogers	Black Orpingtons	62	87
W. F. Ruhl	Do.	50	84
V. J. Rye	Do.	40	73
*C. C. Dennis	Do.	43	58
F. J. Murphy	Do.	16	26
Jas. Ferguson	Rhode Island Reds	24	24
Mos. Stephens	Black Orpingtons	20	20
Total ... ..	...	5,478	9,032

DETAILS OF SINGLE HEN PENS.

Competition.	A.	B.	C.	D.	E.	F.	Total..
LIGHT BREEDS.							
C. H. Singer	34	49	32	23	30	41	209
S. L. Grenier	32	31	36	34	35	32	200
W. and A. W. Hinds	27	41	23	23	40	43	197
N. A. Singer	30	39	38	36	25	27	195
J. W. Newton	34	35	32	17	31	37	186
Rockview Poultry Farm	32	40	34	34	24	18	182
Oakleigh Poultry Farm	36	33	28	28	32	24	181
Ancona Club	30	28	35	23	26	37	179
O. Goos	28	36	36	22	26	30	178
Beckley Poultry Farm	35	24	15	33	31	36	174
J. W. Short	24	26	31	34	33	16	164
R. C. J. Turner	13	30	32	31	15	36	157
J. M. Manson	19	18	32	32	23	26	150
Mrs. L. Andersen	11	32	31	35	17	19	145
Bathurst Poultry Farm	22	29	23	30	20	21	145
Geo. Williams	32	34	12	27	17	16	138
Arch Neil	23	16	11	28	35	24	137
H. P. Clarke	32	10	28	15	22	23	130
H. Fraser	30	15	17	15	25	28	130
A. C. G. Wenck	20	12	22	26	18	27	125
Mrs. R. E. Hodge	11	21	11	28	30	24	125
C. A. Goos	20	35	23	14	5	5	102
Mrs. E. White	16	11	30	20	11	12	100
J. Purnell	10	0	20	3	21	9	63
N. J. Nairn	23	1	19	10	2	1	56

EGG-LAYING COMPETITION—continued.
DETAILS OF SINGLE HEN PENS—continued.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
HEAVY BREEDS.							
W. Becker	40	43	39	33	24	30	209
Jas. Hutton	35	32	40	28	18	28	181
R. Burns	39	22	26	14	49	30	180
Mrs. A. E. Gallagher	30	36	27	29	27	22	171
Jas. Ferguson	34	31	29	24	30	22	170
E. Walters	39	38	17	17	21	29	161
Jas. Potter	14	36	26	23	23	35	157
Mrs. A. Kent	17	43	26	38	16	4	144
H. M. Chaille	18	33	34	32	6	16	139
Parisian Poultry Farm	7	14	26	27	27	35	136
J. H. Jones	22	26	26	21	7	32	134
E. F. Dennis	36	22	16	18	27	14	133
R. Holmes	23	12	27	11	23	31	127
T. Hindley	18	29	30	33	8	4	122
C. C. Dennis	12	17	2	10	8	9	58

CUTHBERT POTTS, Principal.

ZILLMERE COMPETITION REPORT FOR APRIL.

The Sixth Single Test Laying Competition organised by the Queensland Branch of the N.U.P.B.A. was commenced at Zillmere on 1st April. There are 86 White Leghorns, 34 Black Orpingtons, and 12 other varieties under test, comprising two each Barred Rocks, Langshans, Minorcas, Anconas, Brown Leghorns, and Silver Wyandottes. Additional interest attaches to this competition on account of the fact that two birds are from Tasmania and eight from New South Wales. Some birds have not yet settled down to their new quarters and others are starting to moult, while No. 115 is broody. The total number of eggs for the month was 1,362, an average of 10.32 per bird.

WHITE LEGHORNS.

Pen No.	Owner.	Pen No.	Owner.
62	Miss L. M. Dingle	76	W. Shaffrey
8	Oakleigh P.F.	18	A. W. Ward
42	W. Wakefield	32	H. Needs
14	Enroh Pens	50	J. Harrington
33	A. S. Walters	10	R. C. J. Turner
40	J. Earl	48	R. D. Chapman
75	W. Shaffrey	65	R. Duff
66	R. Duff	55	G. Baxter
15	W. J. Berry	57	H. Fraser
22	M. F. Newberry	74	A. Hodge
41	W. Wakefield	7	Oakleigh P.F.
13	Enroh Pens	35	J. T. Webster
27	H. T. Britten	28	H. T. Britten
45	F. R. Koch	26	E. Stephenson
61	L. M. Dingle	59	G. Scaletti
64	S. Lloyd	3	T. H. Craig
81	J. E. G. Purnell	58	H. Fraser
30	W. and G. W. Hindes	24	Parisian P.Y.
36	J. T. Webster	38	G. Williams
49	J. Harrington	39	J. Earl
16	W. J. Berry	19	W. Witt
31	H. Needs	20	W. Witt
43	Kelvin P.Y.	11	A. Neil
72	W. H. Forsayth	46	F. R. Koch

ZILLMERE COMPETITION REPORT FOR APRIL—continued.

WHITE LEGHORNS—continued.

Pen No.	Owner.		Pen No.	Owner.	
51	Kidd Bros.	9	1	Carinya P.F.	3
69	R. Shaw	9	2	Carinya P.F.	3
54	H. Holmes	8	4	T. H. Craig	3
70	R. Shaw	8	44	Kelvin P.Y.	3
17	A. W. Ward	7	71	W. H. Forsyth	3
25	E. Stephenson	7	73	A. Hodge	3
37	G. Williams	7	77	W. Smith	3
84	L. Andersen	7	47	R. D. Chapman	3
86	A. Cowley	6	83	L. Andersen	2
6	P. J. Fallon	5	68	J. and G. Green	2
21	M. F. Newberry	5	82	J. E. G. Purnell	1
29	W. and G. W. Hindes	5	9	R. C. J. Turner	1
56	G. Baxter	5	12	A. Neil	0
34	A. S. Walters	5	23	Parisian P.Y.	0
67	J. and G. Green	5	52	Kidd Bros.	0
78	W. Smith	5	53	H. Holmes	0
85	A. Cowley	5	60	G. Scaletti	0
5	P. J. Fallon	4	79	Wm. Bliss	0
63	S. Lloyd	4	80	Wm. Bliss	0

BLACK ORPINGTONS.

Pen No.	Owner.		Pen No.	Owner.	
95	J. Potter	27	106	W. Smith	7
96	J. Potter	25	88	Parisian P.Y.	6
112	H. M. Chaille	25	91	J. Pryde	5
92	J. Pryde	24	105	W. Smith	4
119	J. Harrington	24	107	E. F. Dennis	4
111	H. M. Chaille	23	117	E. C. Raymond	4
102	Enroh Pens	22	97	W. Shaffrey	3
120	J. Harrington	21	108	E. F. Dennis	3
110	T. H. Brotherton	20	109	T. H. Brotherton	3
113	E. Walters	19	118	E. C. Raymond	2
89	K. Macfarlane	17	94	H. B. Stephens	1
87	Parisian P.Y.	16	90	K. Macfarlane	0
99	S. Donovan	15	98	W. Shaffrey	0
115	C. C. Dennis	15	101	Enroh Pens	0
104	L. Pritchard	12	103	L. Pritchard	0
93	H. B. Stephens	11	114	E. Walters	0
100	S. Donovan	9	116	C. C. Dennis	0

OTHER VARIETIES.

Pen No.	Owner.		Pen No.	Owner.	
128	A. S. Walters (B.R.)	24	124	J. Ferguson (Anc.)	1
126	J. Ferguson (Lang.)	16	125	J. Ferguson (Lang.)	1
131	W. H. Forsyth (S.W.)	16	121	Parisian P.Y. (B.L.)	0
127	A. S. Walters (B.R.)	6	122	Parisian P.Y. (B.L.)	0
130	R. A. Girling (Min.)	6	123	J. Ferguson (Anc.)	0
129	R. A. Girling (Min.)	4	132	W. H. Forsyth (S.W.)	0

REMOVAL OF BANANA PLANTS PROHIBITED.

An order has been issued under the Diseases in Plants Act prohibiting the removal of any banana plants (except the fruit thereof) from what is known as the North Coast Fruit District. This notice has been issued to prevent the spread of the banana beetle borer. The county of Lennox and that part of the county of Canning embraced in Bribie Island and the parish of Wararba are exempted from the prohibition, as the latter described area is still free from the borer.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING APRIL 1923 AND 1922 FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	April.	No. of Years' Records.	April, 1923.	April, 1922.		April.	No. of Years' Records.	April, 1923.	April, 1922.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
	In.		In.	In.		In.		In.	In.
Atherton	4.56	22	2.38	2.14	Nambour	4.94	27	19.06	1.36
Cairns	12.19	41	5.01	11.85	Nanango	1.83	41	1.71	0.07
Cardwell	9.74	51	5.69	3.92	Rockhampton ...	2.23	52	2.82	0.78
Cooktown	9.21	47	4.59	7.68	Woodford	4.15	36	7.14	0.88
Herberton	4.36	36	1.95	1.89					
Ingham	8.86	31	6.75	4.58					
Innisfail	21.62	42	15.37	10.27					
Mossman	12.00	15	5.64	6.13					
Townsville	3.83	32	0.83	0.27					
<i>Central Coast.</i>					<i>Darling Downs.</i>				
Ayr	2.86	36	0.55	0.02	Dalby	1.24	53	0.45	...
Bowen	2.90	52	0.85	0.13	Emu Vale	1.16	27	0.61	0.05
Charters Towers ...	1.76	41	0.84	0.05	Jimbour	1.26	35	0.30	...
Mackay	6.78	52	4.66	2.54	Miles	1.38	38	0.39	...
Proserpine	6.70	20	2.36	2.51	Stanthorpe	1.69	50	0.78	0.49
St. Lawrence	2.80	52	3.21	0.61	Toowoomba	2.46	51	0.74	0.24
					Warwick	1.64	58	0.36	0.05
<i>South Coast.</i>					<i>Maranoa.</i>				
Biggenden	1.71	24	5.74	0.09	Roma	1.26	49	0.86	...
Bundaberg	2.88	40	6.60	0.50					
Brisbane	3.63	72	5.83	0.27					
Childers	2.46	28	6.91	0.57					
Crohamhurst	5.70	30	14.39	1.72					
Esk	2.62	36	2.43	0.07					
Gayndah	1.30	52	3.35	...					
Gympie	3.09	53	7.23	0.30					
Glasshouse Mts. ...	4.88	18	11.05	0.76					
Kilkivan	2.06	44	2.37	...					
Maryborough	3.31	52	9.19	0.12					
					<i>State Farms, &c.</i>				
					Bungeworgorai ...	0.77	9	0.91	...
					Gatton College ...	1.62	24	0.75	0.02
					Gindie	1.19	24	1.21	...
					Hermitage	1.25	17	0.36	0.03
					Kairi	5.27	9	3.86	3.01
					Sugar Experiment Station, Mackay	5.30	26	3.66	2.15
					Warren	1.19	9	...	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for April, 1923, and for the same period of 1922, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
State Meteorologist.

WHEN TO INOCULATE.

The spring or autumn is the best time to inoculate for tick fever, providing the animals have access to green feed and fresh water, and suitable shade trees.

Stud animals can be done at any time of the year, providing they are stalled, and not exposed to extremes of temperature, and not unduly excited during the inoculation fever period, which usually ranges from the eighth to the twentieth day.

If the animal responds to the injection of recovered blood, it is not necessary to reinoculate, as the animal will not react again.

Many years of close observation have definitely demonstrated that there is no such thing as strong and mild blood. The apparent difference is due to variation in the susceptibility of the animal inoculated. Some animals are so resistant at the time of inoculation that they fail to react, and show no sign of illness, while others injected with the same blood readily react, in fact, certain individuals are so susceptible that the inoculation fever may be so severe as to end fatally.

If ticks are always present on the farm, it is not necessary to inoculate every year.—C. J. POUND, Government Bacteriologist.

General Notes.

Open Season for Opossums.

An Order in Council has been issued under "*The Animals and Birds Act of 1921*," the effect of which is to provide for an open season for opossums for two months from the 1st June, 1923, to the 31st July, 1923. The season for native bears remains closed.

Northern Pig Pool.

A notification has been issued under the Primary Products Pools Act, stating that it is the intention to create a pool for pigs raised in the Petty Sessions Districts of Atherton, Herberton, and Chillagoe, for two years from the 1st July, 1923. A notice has also been issued calling for nominations for the membership of the proposed board.

Departmental Appointments.

Mr. A. E. Mitchell, of Norman avenue, Norman Park, has been appointed an Inspector under "*The Slaughtering Act of 1898*," at the Department of Agriculture and Stock as from the 18th May, 1923.

Messrs. A. Naglo and A. Hamilton, of Capella, and Manly, N.S.W., respectively, have been appointed Agricultural Field Assistants as from the 19th May.

Mr. H. N. Gannon, of Woodbury, Central Queensland, has been appointed an Honorary Inspector under "*The Diseases in Plants Act of 1916*."

Checking Prickly-Pear—An Experiment Endangered.

It is expected that within twelve months it will be possible to commence on a big scale the distribution of cochineal insects for the destruction of prickly-pear. Some six varieties of wild cochineal insect have been under observation in the experimental laboratory at Sherwood, where large quantities are being carefully bred in sealed cages. Unfortunately, this entire scheme of the Commonwealth Prickly-pear Board is in danger of being upset by the action of individuals in using a Chico cochineal in pear country. This cochineal, said the Minister for Lands (Hon. J. H. Coyne), in the course of a recent Press statement, has become contaminated with the lady-bird predator, which destroys the cochineal.

Mr. Coyne added: "In order that the purebred cochineals, which are now at the Government laboratory, should have a fair chance to exert their full effectiveness upon the prickly-pear pest when liberated, it is obvious that the public should wholly refrain from disseminating the so-called Chico cochineal with which is inseparably associated the cochineal destroying lady-bird beetle. If, however, the public persists in distributing this contaminated cochineal, the highly beneficial results which are to be expected from this group of insects, will, to a great extent, be lost."

Railway Department Commended—Appreciative Fruitgrowers.

The Stanthorpe District Council of Fruitgrowers has written to the Commissioner, expressing satisfaction with the manner in which the fruit train from the Granite Belt was run during the past season. The department, it declares, carried out all details in connection with the running of the train in a way highly satisfactory to the growers, and the train invariably arrived at Roma Street well up to time, which enabled those in charge of the transport scheme at the Brisbane end to have the fruit unloaded in good time for the opening of the markets. In view of the criticism which was sometimes directed at the department, the council considers it only fair to say that it was very well pleased with the efforts of the department on behalf of the growers during the past season. The Commissioner has also received the following appreciative letter from the Stanthorpe Tomato Pool, through the Manager, Mr. J. S. Mehan:—

"Now that the operations of the Stanthorpe Tomato Pool have ceased, I am instructed by the board to thank you for the assistance give them throughout the season. Train staffs, gatekeepers, and station employees have carried out their duties to the mutual advantage of your department, my board, and the growers. It is with pleasure I forward the board's instructions."

New Queensland Friesian Record.

The secretary of the Friesian Herd Book advises that a new Queensland Friesian record has been established by Mr. P. P. Falt's cow, Dairymaid. In nine months she has produced 15,792 lb. milk, and 696.58 lb. butter fat equal to 819½ lb. commercial butter. She gave 4½ gallons of milk on the last day of her test.

Dairymaid was bred by the Queensland Agricultural College, and was sired by their bull, Denmark, now in the herd of Mr. R. S. Alexander, Toogoolawah. Her dam is Maid of Honour by Cheeseman. Dairymaid is eight years old, and one of the most handsome Friesian cows in the Commonwealth. Mr. P. P. Falt has in his stud at Tingoorra, Kingaroy line, many fine Friesians, and has made good tests with several other animals.

Nitrogenous Fertilisers—Comparative Experiments.

The "Experiment Station Record," published by the United States Agricultural Department, supplies some useful information on comparative experiments with different nitrogenous fertilisers. Experiments on clay, sand, loam, and peat soils on nine different varieties of crops extending over a period of four years were arranged in order to determine the relative fertilising values of sodium nitrate, sulphate of ammonia, and lime nitrogen. The results showed that nitrate of soda gave the best results in all cases, followed by sulphate of ammonia, and then lime nitrogen. Sulphate of ammonia gave its poorest and best results with potatoes, and its fertilising value varied from 64 to 94 per cent. of that of nitrate of soda. Lime nitrogen gave its best results with turnips, oats, and cabbage. Its fertilising value varied from 23 to 85 per cent. of that of nitrate of soda.

Illawarra Butter Tests.

The secretary of the Illawarra Milking Shorthorn Society of Australia, 303 Queen street, Brisbane, advises that the cows Viola 26th of Darbalara and Bella 3rd of Kilbirnie, the property of Messrs. Macfarlane Bros., Kilbirnie stud, Radford, have completed their 273 days' test for the advanced register.

Viola 26th of Darbalara yielded 9,854½ lb. milk and 367.84 lb. fat, 484.94 lb. commercial butter in the period. She was two years six months old at the beginning of her test, and was bred by the Scottish Australian Investment Company, Darbalara. She is by Flagon of Darbalara, ex Viola 12th of Darbalara.

Bella 3rd of Kilbirnie yielded 11,269½ lb. milk and 412.19 lb. fat, equal to 484.94 lb. commercial butter in the period. She was three years old at the beginning of her test, and was bred by Macfarlane Bros., Radford, Queensland. Her sire is Sovereign of Kilbirnie (31), by Piastré of Oakbank, ex Bella (111), and her dam is Bella (111), by Musket 3rd, ex Mayflower.

The Drought Problem—A National Question.

The drought problem will probably be one of the first things tackled by Parliament when it meets in July. Included in important schemes for drought resistance, which the Government is now considering preparatory to introducing the necessary legislation, are proposals for water and fodder conservation for the farmers.

"These proposals," said the Minister for Agriculture and Stock (Hon. W. N. Gillies) in the course of a recent Press interview, "if carried into effect, together with the proposed co-operative legislation and rural bank, should make drought relief by the Government practically unnecessary."

"The whole policy of the Government and of the Council of Agriculture," added Mr. Gillies, "is to obviate the necessity of anything in the nature of charity, because farmers, as a class, are averse from charity. Hence the proposed legislation, which is the outcome of a comprehensive scheme drawn up by the Council of Agriculture."

"The Government agrees with the contention of the Council of Agriculture that fodder and water conservation are not questions alone for the farmers to solve. They are national questions, because any shortage of water and fodder affects not only the farmers themselves but the community as a whole. I am personally of the opinion that Nature has supplied us with an abundance of both fodder and water, and it is for man to conserve the bounteous things Nature provides. Even if these things have been neglected in the past, that is no reason why they should be neglected in the future."

"Meanwhile, the Government is giving effect to a scheme for the relief of settlers in drought-stricken areas in the West, on the Downs, and in the Burnett. Cabinet recently approved of this scheme, which provides for relief in the way of food and

clothing. The question of supplying fodder to settlers who have been hard hit by the drought has yet to be decided by Cabinet. Arrangements have already been made for the State Wheat Board to supply seed wheat at the expense of the Government to settlers who are financially unable through drought to purchase it.

"If a settler has no water on his farm, the sooner he is put on other land the better." This, as stated by Mr. Gillies, is the view of the Premier (Mr. Theodore). "It really involves a reclassification of land," commented Mr. Gillies, "and the proposed legislation will probably deal with this phase of the question."

The Queensland Nut—A Thin-Shelled Variety.

The Queensland nut is generally recognised by those acquainted with it as one of the best flavoured of all the nut family, its only drawback being its very thick, hard shell. Some years ago plant breeders in Queensland endeavoured to find or breed a thin-shelled variety, but they met with no great success. Mr. J. B. Waldron, of Upper Eungella, Tweed River, however, recently brought under the notice of the Queensland Agricultural Department a very thin-shelled variety of this nut grown on his property. Mr. Waldron has a great variety of Queensland nuts growing on his place, the shells varying considerably in thickness and hardness.

Mr. C. T. White, Government Botanist, recently inspected the trees at Mr. Waldron's place, and brought back a number of seeds, from which it is intended to propagate at the Botanic Gardens and the department's nursery at Bribie Island.

It is hoped that similar success will follow the attempts to improve these nuts, as resulted in the case of American experiments with the cultivation of thin-shelled and large seeded varieties of the pecan, for it is realised that there are great commercial possibilities with the Queensland nut once the shell difficulty is overcome. The commercial value of the Queensland nut has long been recognised in America, considerable numbers of these trees being grown in Florida.

The Charters Towers Show.

The Annual Show of the Towers Pastoral, Agricultural, and Mining Association will take place on 11th and 12th of July. In the April Journal the Towers Show was inadvertently listed for the following month, and probable visitors and exhibitors are advised that the 1923 dates for this important Northern exhibition are definitely as above-mentioned.

Land for Settlement.

In extending a welcome to the Overseas' Settlement Delegation on behalf of the Government of Queensland, the Minister for Agriculture and Stock (Hon. W. N. Gillies) said that the Government appreciated the importance of their visit, and he wished them to clearly understand that his Government were not opposed to immigration on sound, healthy lines. He explained that during the war and its aftermath his Government, in common with all other Governments, found it difficult to carry out large schemes of land settlement, and until recently had done very little except to deal with returned soldiers and local applicants. He was now pleased to be able to say that the Government had several large land settlement schemes under way and receiving consideration. These included the Upper Burnett and Callide Valley, about 3,000,000 acres; Clermont and Capella, 180,000 acres; Palmerston, 180,000 acres; Roma (wheat lands), 484,000 acres; Goondiwindi (wheat lands), 254,000 acres. There was also the Dawson River irrigation area, Tully-Banyan sugar lands, Boonjee and Upper Tully scrub lands, in all about 5,000,000 acres. Some of these schemes, Mr. Gillies said, were well in hand, and the Lands Department advised that during the next financial year, not fewer than 2,000 families can be settled on these areas. It will be seen, therefore, he said, that immediately local demand is satisfied there will be plenty of room for overseas settlers. The desire is that when the settlers arrive from overseas, either employment or land must be available for them. To simply bring settlers here without making proper provision for them would be no good to the immigrant or to Queensland.

Activities of the N.U.P.B.A.—Awards—Egg Pool Favoured.

At the last monthly meeting of the National Utility Poultry Breeders' Association, held in the National Association Rooms, Mr. A. S. Walters presided over an attendance of about sixty members. Prizes won in the recent Zillmere Single Pen Egg-laying Competition were presented by Mr. J. M. Manson. In the course of his remarks Mr. Manson stated that he had recently toured the South, and had visited one large poultry plant where employment was found for several workmen and large income taxes paid each year by the proprietor. In view of the fact that, in his opinion, sunny Queensland was, in comparison with other States, wonderfully adapted to poultry keeping, Queensland poultrymen should some day be in a like position.

The first prize for highest individual score, a £5 5s. trophy donated by Mr. Manson, and first prize for highest aggregate, a pedigree 300-egg cockerel bred by Kidd Bros. from recent importations, were both won by Mr. Davis, a veteran in the poultry world. Second prize in White Leghorns went to Mr. A. Cowley, of Gap Soldiers' Settlement. Mr. E. F. Dennis's Black Orpington won first in the heavy breeds, while Mr. M. H. Campbell's donation for highest winter test went to Mr. Sherman. Mr. M. J. Lyons's White Leghorn hen won the type prize in the light breed section, and Mr. H. Pearce's Black Orpington carried off a similar prize in the heavy variety, both prizes being donated by Mr. W. R. Parker. Competitors listed as under won certificates for birds which laid 250 or more eggs of standard weight, viz.:—Messrs. Neil, Woodward, J. E. G. Purnell, A. Hodge, R. D. Chapman, W. H. Lingard, C. C. Dennis, G. Trapp (2), J. Hutton, P. J. Fallon, T. J. Carr. Mr. Manson promised another £5 5s. trophy for competition in the current test, and raised a short discussion on weight of White Leghorns, as he considered 3½ lb. too heavy for a pullet of, say, five and a-half months. In reply, Mr. Campbell stated that the Zillmere Competition was the most stringent in the Commonwealth, and he would be very sorry to see this condition altered.

Mr. Manson's concluding remarks were listened to with great interest. Within the next few weeks, he stated, Queensland poultrymen would be required to settle a question of vital importance to the industry. Mr. Manson stated that his business brought him into contact with a great number of businesses controlled by pools, and he was convinced that pooling was a great advantage to both the producer and consumer, the former receiving a fair return for his labour, and the latter being protected from exploitation by speculators and "cornering" of market produce. He quoted several instances, the chief being the currant and raisin industry of Victoria, which was started and financed with the idea of helping the farmer, not exploiting him. The results had been marvellous; it did not pay to keep out of the pool. Several other examples were mentioned, such as the canary seed and arrowroot industries, which had been placed on a sound financial footing by pooling under Government encouragement, when previously failure had stared the producer in the face. He was certain that the Egg Pool would be a brilliant success. Mr. Campbell especially emphasised and endorsed Mr. Manson's remarks about pooling, as the aims and objects of the pool had been considerably misrepresented. With one exception every *bonâ fide* poultryman present was in favour of pooling.

Answers to Correspondents.

Black Maurilius Bean.

T. G. (Childers).—The Government Botanist, Mr. C. T. White, F.L.S., advises:—The specimen sent for identification is the Black Maurilius Bean (*Stizolobium aterrimum*). The bean is largely grown in tropical and subtropical countries as a green manure. It has been in Queensland for some years, but has not, I think, been cultivated here to any extent. Its use seems solely as a green manure, as I have not seen any reference to the vines being used as fodder, or the seeds for human food. It is very closely allied to the Florida Velvet Bean.

Kola Nut.

J. A. H. (Gooroolba).—The Government Botanist, Mr. C. T. White, F.L.S., replies.—The Kola Nut is a native of tropical Africa. It requires a hot tropical climate for its growth. Young plants have been raised under glass at Brisbane, but will not stand planting out. It might do all right at Cairns, but it is not likely to succeed much further south. There is a very big export of Kola Nuts from the Gold Coast, tropical West Africa, the value being well over £100,000 per annum. The principal consumers are the natives of tropical Africa, and the nut enters largely into the social and dietetic economy of their daily life. It is eaten largely as a stimulant. The tree was introduced into the West Indies for the benefit of the negroes in the slave days, and has become naturalised at Jamaica and some other parts. Kola Nuts are not usually planted but the nuts gathered from wild trees. The trees start to bear at six to seven years, though the crop at this time is small. Trees are planted about 20 feet apart each way.

Orchard Notes for July.

THE COAST DISTRICTS.

The marketing of citrus fruits will continue to occupy the attention of growers. The same care in the handling, grading, and packing of the fruit that has been so strongly insisted upon in these monthly notes must be continued if satisfactory returns are to be expected. Despite the advice that has been given over and over again, some growers still fail to grasp the importance of placing their fruit on the market in the best possible condition, and persist in marketing it ungraded, good, blemished, and inferior fruit being met with in the same case. This, to say the least, is very bad business, and as some growers will not take the necessary trouble to grade and pack properly, there is only one thing to do, and that is to fix standards of quality and see that the fruit offered for sale complies with the standards prescribed and that the cases are marked accordingly.

Where the crop has been gathered, the trees can be given such winter pruning as may be necessary, such as the removal of broken or diseased limbs or branches, and the pruning out of any superfluous wood from the centre of the tree. Where gumming of any kind is seen it should be at once attended to. If at the collar of the tree and attacking the main roots, the earth should be removed from around the trunk and main roots—all diseased wood, bark, and roots should be cut away, and the whole of the exposed parts painted with Bordeaux paste.

When treated, do not fill in the soil around the main roots, but allow them to be exposed to the air for some time, as this tends to check any further gumming. When the gum is on the trunk or main limbs of the tree, cut away all diseased bark and wood till a healthy growth is met with, and cover the wounds with Bordeaux paste.

If the main limbs are infested with scale insects or attacked by any kind of moss, lichen, or fungus growth, they should be sprayed with lime sulphur.

Towards the end of the month all young trees should be carefully examined for the presence of elephant beetles, which, in addition to eating the leaves and young bark, lay their eggs in the fork of the tree, and when the young hatch out they eat their way through to the wood and then work between the wood and the bark, eventually ringbarking one or more of the main limbs, or even the trunk. A dressing of strong lime sulphur to the trunk and fork of the tree, if applied before the beetles lay their eggs, will act as a preventive. In the warmer parts a careful watch should also be kept for the first appearance of any sucking bugs, and to destroy any that can be found. If this is done systematically by all growers the damage done by this pest will be very much reduced.

Citrus trees can be planted throughout the month. Take care to see that the work is done in accordance with the instructions given in the June notes. All worn-out trees should be taken out, provided the root system is too far gone to be renovated, but when the root system is still good the top of the tree should be removed till sound, healthy wood is met with, and the portion left should be painted with a strong solution of lime sulphur. If this is done the tree will make a clean, healthy growth in spring.

Land intended for bananas and pineapples can be got ready, and the existing plantations should be kept in a well-cultivated condition so as to retain moisture in the soil.

Bananas intended for sending South can be allowed to become fully developed, but not coloured, as they carry well during the colder months of the year, unless they meet with a very cold spell when passing through the New England district of New South Wales, when they may be injured by the cold.

The winter crop of smoothleaf pines will commence to ripen towards the end of the month, and when free from black heart (the result of a cold winter) or from fruitlet core rot, they can well, as they are of firm texture and stand handling. Where there is any danger of frost or even of cold winds, it pays to cover pines and also the bunches of bananas. Bush hay is used for the former, and sacking for the latter.

Strawberries should be plentiful during the month, provided the weather is suitable to their development, but if there is an insufficient rainfall, then irrigation is required to produce a crop. Strawberries, like all other fruits, pay well for careful handling, grading, and packing, well-packed boxes always realising a much higher price than indifferently packed ones on the local market. Where strawberries show signs of leaf blight or mildew, spray with Bordeaux mixture for the former and with sulphide of soda for the latter.

When custard apples fail to ripen when gathered, try the effect of placing them in the banana-ripening rooms, and they will soon soften instead of turning black.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

July is a busy month for the growers of deciduous fruits, as the important work of winter pruning should, if possible, be completed before the end of the month, so as to give plenty of time for spraying and getting the orchard into proper trim before spring growth starts.

With regard to pruning, follow the advice given in the June number; and if you are not thoroughly conversant with the work, get the advice of one or other of the Departmental officers stationed in the district.

Pruning is one of the most important orchard operations, as the following and succeeding seasons' crops depend very largely on the manner in which it is carried out. It regulates the growth as well as the number and size of the fruit, as if too much bearing wood is left, there is a chance of the tree setting many more fruits than it can properly mature, with a result that unless it is rigorously thinned out, it is undersized and unsaleable. On the other hand, it is not advisable to unduly reduce the quantity of bearing wood, or a small crop of overgrown fruit may be the result.

Apples, pears, and European varieties of plums produce their fruits on spurs that are formed on wood of two-years' growth or more; apricots and Japanese plums on new growth, and on spurs; but peaches and nectarines always on wood of the previous season's growth, as once peachwood has fruited it will not produce any more from the same season's wood, though it may develop spurs having a new growth or new laterals which will produce fruit.

The pruning of the peaches and nectarines, therefore, necessitates the leaving of sufficient new wood on the tree each season to carry a full crop, as well as the leaving of buds from which to grow new wood for the succeeding year's crop. In other words, one not only prunes for the immediately succeeding crop, but also for that of the following season.

All prunings should be gathered and burnt, as any disease that may be on the wood is thoroughly destroyed. When pruned, the trees are ready for their winter spraying with lime-sulphur.

All kinds of deciduous trees can be planted during the month provided the ground is in a proper state to plant them. If not, it is better to delay planting until August, and carry out the necessary work in the interval. The preparation of new land for planting can be continued, although it is somewhat late in the season, as new land is always the better for being given a chance to mellow and sweeten before being planted. Do not prune vines yet on the Granite Belt; they can, however, be pruned on the Downs and in the western districts.

Trees of all kinds, including citrus, can also be planted in suitable situations on the Downs and western districts, and the pruning of deciduous trees should be concluded there. If the winter has been very dry, and the soil is badly in need of moisture, all orchards in the western districts, after being pruned and ploughed, should receive a thorough irrigation (where water is available) about the end of the month, so as to provide moisture for the use of the trees when they start growth. Irrigation should be followed by a thorough cultivation of the land to conserve the water so applied. As frequently mentioned in these notes, irrigation and cultivation must go hand in hand if the best results are to be obtained, especially in our hot and dry districts.

Farm and Garden Notes for July.

FIELD.—Practically the whole of the work on the land for this month will be confined to the cultivation of winter crops, which should be now making good growth, and to the preparation of land for the large variety of crops which can be sown next month. Early-maturing varieties of wheat may be sown this month. The harvesting of late-sown maize will be nearing completion, and all old stalks should be ploughed in and allowed to rot. Mangels, swedes, and other root crops should be now well away, and should be ready for thinning out. Frosts, which can be expected almost for a certainty this month, will do much towards ridding the land of insect pests and checking weed growth. Cotton-picking should be now practically finished and the land under preparation for the next crop. The young lucerne should be becoming well established; the first cutting should be made before the plants flower—in fact, as soon as they are strong enough to stand the mowing machine, and the cutting of subsequent crops should be as frequent as the growth and development of the lucerne plants permit. Ordinarily cutting should be regulated to fit in with the early flowering period—i.e., when about one-third of the plants in the crop are in flower.

KITCHEN GARDEN.—Should showery weather be frequent during July, do not attempt to sow seeds on heavy land, as the latter will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be reworked until fine weather has lasted sufficiently long to make it friable. In fine weather, get the ground ploughed or dug, and let it lie in the rough till required. If harrowed and pulverised before that time, the soil is deprived of the sweetening influences of the sun, rain, air, and frost. Where the ground has been properly prepared, make full sowings of cabbage, carrot, broad beans, lettuce, parsnips, beans, radishes, leeks, spring onions, beetroot, eschalots, salsify, &c. As westerly winds may be expected, plenty of hoeing and watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower, and stake up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts, it will be quite safe to sow cucumbers, marrows, squashes, and melons during the last week of the month. In colder localities, it is better to wait till the middle or end of August. Get the ground ready for sowing French beans and other spring crops.

FLOWER GARDEN.—Winter work ought to be in an advanced state. The roses will not want looking after. They should already have been pruned, and now any shoots which have a tendency to grow in wrong directions should be rubbed off. Overhaul the ferneries, and top-dress with a mixture of sandy loam and leaf mould, staking up some plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, holly-hocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolour, marigold, cosmos, cockscombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tuberoses, amaryllis, pancratium, ismene, erinums, belladonna, lily, and other bulbs. Put away dahlia roots in some warm, moist spot, where they will start gently and be ready for planting out in August and September.

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